CES:

Cost-Estimate Strategy for Reproductive Health Commodity Management

User's Guide

April 2000

Rational Pharmaceutical Management (RPM) Project
Management Sciences for Health

MotherCare Project
John Snow, Inc.

United States Pharmacopeia

THIS PUBLICATION WAS MADE POSSIBLE THROUGH SUPPORT PROVIDED BY THE U.S. AGENCY FOR INTERNATIONAL DEVELOPMENT, UNDER THE TERMS OF COOPERATIVE AGREEMENT NUMBERS HRN-A-00-92-00059-13 AND HRN-A-00-95-00002 (MSH); HRN-A-00-92-00052 AND HRN-A-00-95-00001 (USP); AND CONTRACT NUMBERS HRN-C-00-93-00038-00 AND HRN-C-00-98-00050-00 (MOTHERCARE/JSI). ANY OPINIONS EXPRESSED HEREIN ARE THOSE OF THE AUTHOR(S) AND DO NOT NECESSARILY REFLECT THE VIEWS OF THE U.S. AGENCY FOR INTERNATIONAL DEVELOPMENT.

FOR MORE INFORMATION, CONTACT:

MANAGEMENT SCIENCES FOR HEALTH
1515 WILSON BOULEVARD, SUITE 710
ARLINGTON, VIRGINIA 22209 USA
PHONE: (703) 524-6575
FAX: (703) 524-7898
E-MAIL: rpm@msh.org

U.S. AGENCY FOR INTERNATIONAL DEVELOPMENT
G/PHN/HN/HPSR
WASHINGTON, D.C. 20523-1817 USA
PHONE: (202) 712-4789
FAX: (202) 216-3702
E-MAIL: aboni@usaid.gov

UNITED STATES PHARMACOPEIA
12601 TWINBROOK PARKWAY
ROCKVILLE, MARYLAND 20852 USA
PHONE: (301) 816-8385
FAX: (301) 816-8374
E-MAIL: nlb@usp.org

JOHN SNOW, INC.
1616 N. FORT MYER DRIVE, 11TH FLOOR
ARLINGTON, VIRGINIA 22209 USA
PHONE: (703) 528-7474
FAX: (703) 528-7480

CONTENTS

APPENDIXES

OVERVIEW

Summary

The *User's Guide* provides comprehensive information about the Cost-Estimate Strategy (CES) tools—the costing spreadsheets and the survey—and how to use them for reproductive health commodity management. Depending upon the user's objectives, it may not be necessary to read all chapters. For example, if the primary aim is to estimate the costs of reproductive health commodities based on standard treatment guidelines, then the chapters relating to the CES Survey can be omitted. If the user's interest is in assessing commodity availability and use in addition to estimating costs, then all chapters should be read. The following paragraphs summarize the contents of each chapter.

Chapter 1 The **Introduction** describes what the CES is and what it can do to help users who have different responsibilities in providing reproductive health services. This chapter provides readers with the basic information about the CES tools so that they can determine if the CES would be of value in their work.

Chapter 2 **Determining the Scope of CES Activities** guides the reader through the key planning decisions that are the basis for implementing the CES activities—developing the local CES Model and conducting the CES Survey. This chapter helps the reader develop criteria for an appropriate and useful application of the methodology.

Chapters 3–6 These four chapters introduce the first of the two major CES tools—the **CES Model** (consisting of costing spreadsheets), describe the three costing variants (the Normative Model, the Country-Specific Model, and the Actual Model) that can be developed, and explain how to use the Excel spreadsheet application. An Excel template file is provided with this *User's Guide*.

Chapter 7 This chapter covers the **CES Survey,** the second major CES tool. Although the design of the CES Survey should be tailored to the local setting and local needs, these chapters contain step-by-step instructions on the survey instruments, and how to plan and conduct the survey and analyze the data. Template survey data collection forms appear in Appendix C, and they are also provided as electronic files in the diskette included with this *Guide*.

Chapter 8 **Using the CES for Decision Making** features guidelines and examples for planning and conducting a CES workshop so the data and findings from the CES activities can be shared and used for in-depth discussion to improve the availability and the appropriate use of reproductive health commodities. The chapter also illustrates the types of planning and management decisions that can be addressed by using the data generated by the CES costing spreadsheets and the CES Survey.

Appendix A **Reproductive Health Management Drug Monographs** provide information on prescription and over-the-counter medicines and nutritional supplements commonly used in reproductive health management. The drug monographs are arranged in alphabetical order, and an index groups them by their therapeutic indications.

Appendix B The **Normative CES Model** is an application of the CES Model using international treatment guidelines. In some parts, especially those covering medical equipment, the format of the Model was extensively adapted to accommodate the way the international guidelines are presented. The Normative Model can be used as a reference source when users develop their own Country-Specific CES Model.

Appendix C Printouts of sample CES Survey data collection forms are attached.

Diskette Content

The enclosed diskette contains two spreadsheet files and seven text files.

Diskette file names:

- CES Model (Excel)

  CES MODEL TEMPLATE CES costing spreadsheet template used to develop the Country-Specific and the Actual CES Models

  NORMATIVE CES MODEL CES costing spreadsheet containing information based on international standard treatment guidelines

- CES Survey Instruments (Word 97)

  FACILITY Health Facility Survey Form

  PRACTICE Health Care Practice Form (with Instructions)

  PATIENT Patient Contact Form

  PROVIDER Health Care Provider Interview

  MOTHER Mothers Interview Form

  PHARMACY Pharmacy Survey Form

  PURCHASE Pharmacy Simulated Purchase Survey Form (with Instructions)

ACRONYMS AND INITIALISMS

ANC	antenatal care
CES	Cost-Estimate Strategy
C-section	cesarean section
GUD	genital ulcer disease
HCP	Health Care Practice
HCPI	Health Care Provider Interview
HFS	Health Facility Survey
ICPD	International Conference on Population and Development
IDA	International Dispensary Association
IM	intramuscular
INN	international nonproprietary name
IV	intravenous
MI	Mothers Interview
MCH	maternal and child health
MSH	Management Sciences for Health
MVA	manual vacuum aspiration
NGO	nongovernmental organization
OPD	out-patient department
PCF	Patient Contact Form
PID	pelvic inflammatory disease
PO	oral preparation
PS	Pharmacy Survey
RH	reproductive health
RPM	Rational Pharmaceutical Management [Project]
RPR	rapid plasma reagin
STD	sexually transmitted disease
STGs	standard treatment guidelines
STI	sexually transmitted infection
TCS	treatment cost sheet
Tx.	treatment
UNICEF	United Nations Children's Fund
USAID	U.S. Agency for International Development
USP	United States Pharmacoepia
UTI	urinary tract infection
VD	venereal disease
WHO	World Health Organization

CHAPTER 1. INTRODUCTION

What Are the Issues in Commodity Management?

Ensuring the regular availability and appropriate use of essential commodities at service delivery points is a critical concern for policy makers, program managers, health care providers, and donors involved in the provision, management, or financing of reproductive health (RH) services. The provision of safe, effective, and timely reproductive health services to women can be improved significantly by addressing a number of key issues:

- Are there essential drugs and medical supplies available at health facilities for health care providers to carry out appropriate reproductive health care? If not, what—and how much—is currently missing?

- How can "essential" drugs and other commodities be identified?

- Do health facilities have basic and functioning medical equipment to provide quality reproductive health care?

- How are health care providers currently treating reproductive health conditions? Are practices in compliance with the standard treatment guidelines (STGs)? If not, is the lack of essential commodities contributing to the gap between norms and practices?

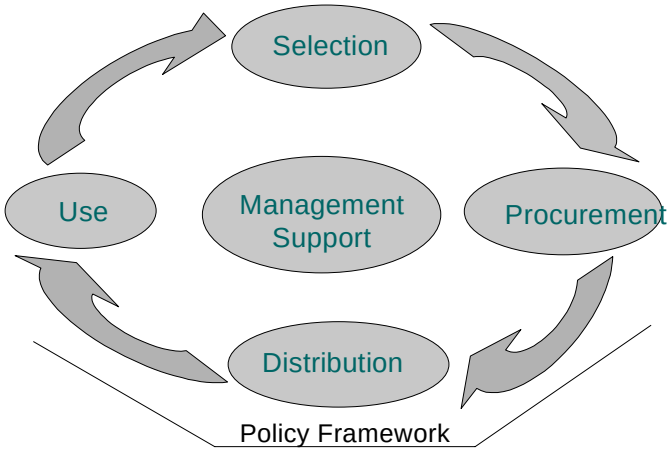
- How often are women asked to buy drugs or medical supplies in order to receive reproductive health services at health facilities because those items are out of stock? What are they typically asked to buy and how much are they spending on commodities?

- How much would it cost to improve the availability of basic commodities for reproductive health services? What are the feasible options within the resources available?

Why Is the Cost-Estimate Strategy Needed?

The importance of these, and similar issues, can be seen by reference to the Drug Management Cycle (Figure 1), which models the relationship between the key functions of selection, procurement, distribution, and use in the management of drugs in health systems.

Figure 1. The Drug Management Cycle



In order to optimize limited financial resources for essential commodities to improve the efficiency and outcomes of reproductive health services, each function in the commodity management cycle should be built on the previous one and lead to the next. The tasks that need to be carried out within each function of the commodity management cycle follow.

- **Selection**
  - Review prevalent health problems
  - Identify treatments of choice
  - Choose individual drugs, dosage forms, necessary supply items, and medical equipment
  - Decide commodities necessary at each level of health care
- **Procurement**
  - Quantify commodity requirements
  - Determine available resources
  - Select procurement methods
  - Manage tenders
  - Establish contract terms
  - Ensure quality of commodities
  - Ensure adherence to contract terms
- **Distribution**
  - Clear customs
  - Perform stock control
  - Perform store management
  - Deliver to depots and health facilities
- **Use**
  - Diagnose
  - Prescribe
  - Dispense
  - Consume by the patient

It is often the case that systematically collected information, which could facilitate addressing the key issues and questions, is not readily available for management purposes. The Cost-Estimate Strategy (CES) aims to redress this lack of information and so contribute to better informed decision making within reproductive health programs.

The CES was developed in response to the recommendations by the International Conference on Population and Development (ICPD) held in September 1994 in Cairo, Egypt, for actions to reduce maternal morbidity and mortality in developing countries. Since that time, donors, governments, and nongovernmental organizations (NGOs) have intensified their efforts to expand access to and the quality of reproductive health services, including provision of reproductive health commodities. However, the information necessary to determine the cost and quantities of required reproductive health drugs and medical supplies is often lacking.

In 1995, representatives from the U.S. Agency for International Development (USAID) Center for Population, Health, and Nutrition and staff from the Rational Pharmaceutical Management (RPM) Project and the MotherCare Project formed the Reproductive Health Working Group. The group's aim was to develop a tool that would provide donor communities, governments, and reproductive health program managers with appropriate methods and information to estimate the cost of supplying needed commodities. The result of this collaboration is the Cost-Estimate Strategy.

What Is the Cost-Estimate Strategy?

The Cost-Estimate Strategy is a planning, budgeting, and management tool for reproductive health commodities. The CES can be used to identify essential pharmaceuticals, medical supplies, and medical equipment for basic reproductive health services and then to estimate the cost of supplying the required quantities of commodities. The cost implications of alternative scenarios—based on different treatment options, target populations, or service expansion—can be calculated and analyzed. Indications of where and how reproductive health commodity management is failing to contribute to quality services can be identified and the basis for solutions established.

What Can the CES Do?

The preparation for the CES—and the data and analysis that result from application of the CES tools–can help users estimate reproductive health commodity needs and identify how they can prioritize their efforts to improve the availability and appropriate use of drugs and other commodities for reproductive health, using the limited resources available. Box 1 highlights the particular considerations for RH program managers.

In brief, the CES—

- Helps **users assess cost implications of treatment options for priority reproductive health conditions** and various alternative service packages for a target population. Users can thus approach the selection and quantification of reproductive health commodities rationally. Supply managers can use lists of commodities developed for each level of care to plan and monitor the procurement and distribution process. The lists of commodities can also serve as the basis of discussion between government officials and donors to strategize the use of donors' assistance for reproductive health commodities.

Box 1.
Why Reproductive Health Program Managers Need to Be Concerned about Commodity Management

Quality of Reproductive Health Care

Unavailability or inappropriate use of essential drugs, medical supplies, and equipment can negatively affect women's access to quality reproductive health care. Even well-trained health care personnel will not be able to implement adequate treatment if required drugs are not available. Medical supplies (such as syringes and needles, IV sets, laboratory test supplies, and chlorine) and medical equipment (such as stethoscopes, scales, and surgical equipment) are equally important. Without essential medical supplies and equipment, proper diagnoses cannot be made, nor can some drug treatment be carried out, even when drugs are available—for example, injectable drugs cannot be used without syringes or an IV set.

Decentralization and Integration of Reproductive Health Services

In recent years, the health care systems in many countries have been undergoing drastic changes involving decentralization and integration of services. More often than not, the necessary training and tools to plan and manage the commodity supply to support the decentralized and integrated health care services are not provided to the local level officials and health care personnel, who are faced with new responsibilities and challenges. Because most functions and responsibilities for the commodity supply system (i.e., selecting, procuring, and distributing) have historically been placed at the central level, very little expertise exists at the lower levels of the system in many countries. A decision to decentralize or integrate services without careful planning and training can cause serious disruptions in the commodity supply system and in the provision of services.

Financial Sustainability

Financial sustainability is another reason why reproductive health program managers should be concerned about commodity management. Drugs, medical supplies, and equipment are usually the most costly recurrent items after personnel costs. As more responsibility for financial sustainability is delegated to the lower level of the system, careful planning and monitoring of the spending for these commodities becomes an important task for managers of each health care facility and officials at the lower levels of the health care system. At the same time, the regular availability of essential drugs and other commodities can be used as a positive incentive for increased demand and satisfaction of clients.

- Provides a **systematic way to identify gaps** in provision of reproductive health services and **inefficiency** in commodity management, that is, the selection, procurement, distribution, and use of reproductive health commodities (see Figure 1).

- Can be adapted to **monitor** the availability of essential commodities.

- Can provide information to guide the **supervision** of, and focus the **training** of, health care providers.

- **Complements existing tools**, such as the World Health Organization's (WHO) Safe Motherhood Assessment Tool and the Mother-Baby Package Costing Tool.

Who Benefits from the Application of the CES Methodology?

People with different responsibility for and perspectives on reproductive health services can benefit from using the data from the CES tools. Some of the different users include the following:

- **Policy makers** at the national level and **reproductive health program managers** at the local level can use CES to—
  - Evaluate current policies and establish realistic standards of care
  - Quantify and cost out current and future needs for reproductive health commodities
  - Explore ways to improve the cost-effectiveness of reproductive health services
  - Improve allocation of resources between competing needs
  - Plan and budget future service scenarios
  - Identify problems and promote rational use of drugs, medical supplies, and equipment

- **Supply managers** at the national and local levels can use CES to—
  - Develop a budget for commodity procurement
  - Improve ways to monitor commodity availability
  - Identify and correct gaps in the allocation of essential reproductive health commodities

- **Educators and trainers** of health care staff can use CES to—
  - Identify gaps in the knowledge and skills of health care providers in the appropriate use of reproductive health commodities
  - Design pre- and in-service training about the cost implications of treatment decisions
  - Develop training materials to promote regular monitoring of commodity stocks at the facility level

- **Donors** supporting reproductive health programs can use CES to estimate commodity needs and associated costs and to identify what assistance they can provide to fill the existing gaps.

Scope of the CES

Commodity Costs

The CES is designed to estimate needs and costs of pharmaceuticals, medical supplies, and medical equipment necessary to provide selected treatment for target conditions and services. The CES does not take into account personnel costs either for health care professionals, who provide care directly to patients, or for administrative staff, who support the service indirectly. Nor does the CES include indirect costs, such as building maintenance, utilities, and depreciation. There are a number of other costing tools available to help cost out these other factors, for example, WHO's Mother-Baby Package Costing Tool. Having a clear understanding of the objectives of a costing exercise will help to determine which tool is most appropriate. The CES can be used in conjunction with other costing tools.

Reproductive Health Services

The CES is designed to meet planning and management needs regarding essential commodities for reproductive health services. The term *reproductive health* refers to a variety of services provided in various forms to meet women's reproductive health needs. These services include counseling and education on sex and human sexuality, family planning, pregnancy-related education and services, infertility services, postabortion services, and sexually transmitted infections (STIs) and HIV/AIDS treatment. Although one-to-one counseling, interpersonal communication, and health education are important but frequently neglected essential services, they are not included in the application of the CES because they do not require equipment or commodities as defined in the previous paragraph.

In this *Guide*, four key groups of reproductive health services are used as examples:

- Antenatal care
- Provision of safe and clean deliveries
- Pregnancy-related complications
- Sexually transmitted infections

The CES can, however, be readily adapted to examine commodity needs of other reproductive health conditions and services as well as those of other medical specialties.

CES Tool Package

In addition to this *User's Guide*, the CES tool package consists of the following—

CES Model Template: The spreadsheet-based costing model without data is provided as an Excel file on a diskette included with this *Guide*.

Normative CES Model: A Excel file containing a sample CES Model with data from the international treatment guidelines and international reference prices is provided on a diskette with this *Guide*. The Normative CES Model can be used to learn about the cost implications of implementing the international norms.

CES Survey Data Collection Instruments: Seven sample survey instruments are provided with this *Guide* (and also provided on diskette). Some parts of the survey forms will need to be adapted for local use. Parts of the survey forms may also be adapted for monitoring commodity stock level or health care providers' practices.

Reproductive Health Management Drug Monographs: The information sheets developed by the U.S. Pharmacopoeia on each drug included in the Normative CES Model can facilitate the selection and use of drugs to be provided in a locally adapted reproductive health service package.

CES Model

The CES costing spreadsheet is designed to calculate the total quantity and costs of drugs, supplies, and medical equipment necessary to provide selected reproductive health services based on specified treatment guidelines. Essential drugs, supplies, and equipment can only be identified after an appropriate standard for the treatment of conditions or for the management of services has been defined.

Step by step, the CES Model takes the CES Implementation Team through key questions for planning reproductive health services, programs, and interventions. By answering these questions, the team develops the following estimates:

- **Costs of drugs and supplies per average episode** or course of treatment for each selected condition and service
- **Weighted average of drug and medical supply costs per episode** by taking into account the estimated proportion of cases treated by multiple treatment options
- **Total quantity and cost of necessary drugs and medical supplies** for selected conditions and services for the target population
- **Unit cost of medical equipment package** per set of treatments and services to be provided in a health facility
- **Total number and costs of medical equipment** needed to treat the target population

In addition to cost information, the CES Model also generates lists of essential commodities, based on the selected treatment guidelines.

- **Master lists of drug and medical supply items and the total quantity** necessary to implement selected treatment guidelines for the target population, by the level of care
- **Master lists of medical equipment items and the quantities required**

> **Note:** The Model is an instrument to process the data entered, so the validity of outputs is determined by the quality of data provided.

CES Survey

The CES Survey is designed to assemble information on commodity management, especially in regard to (1) service and commodity availability, (2) use of reproductive health commodities, and (3) local cost of RH commodities; to obtain data to enable an estimate of the costs of commodities required by current provider practice to be made; and to cross-check a number of assumptions made while developing the Country-Specific CES Model.

1. Service and Commodity Availability

- Are various types of reproductive health services actually provided at each level of care as determined by the policy?

- Are those drugs, medical supplies, and equipment in fact available for health care providers to carry out the treatment recommended by the standard treatment guidelines?

2. Use of Reproductive Health Commodities

- What are the actual practice patterns of the health personnel?
- How do actual practice patterns differ from the standard treatment guidelines?

3. Local Cost of Reproductive Health Commodities

- How much are facilities actually paying for the essential commodities?

- How much are women spending out-of-pocket to purchase commodities for reproductive health services?

A comparison of results generated by the Country-Specific Model and the Actual Model (derived from Survey data) provides the CES user with specific information about the current status and problems in commodity management and in the provision of reproductive health services. The survey data can be used to—

- Adjust commodity needs estimated by the CES Survey
- Reexamine the appropriateness and feasibility of the standard treatment guidelines
- Identify inefficiencies in current commodity procurement
- Identify where reproductive health commodities are under- or oversupplied
- Ascertain inappropriate practices by health care providers
- Identify training needs of health care providers for appropriate use of essential commodities

Reproductive Health Management Drug Monographs

Information on prescription and over-the-counter medicines and nutritional supplements commonly used in Reproductive Health Management is provided to assist clinicians and other members of the CES Team to decide which drugs are required to treat or manage the conditions and services selected for the analysis.

Each drug is described in a monograph that contains details on—
- The drug's international nonproprietary name (INN)

- A short description of its category of use
- Indications pertinent to the drug's use in reproductive health management
- The usual doses, regimen, and length of treatment
- The most common dosage forms, strengths, and brand names available
- Considerations Before Using (for example, on precautions, drug interactions, side, or adverse effects)

Implementation of the CES

Activities

Implementation of the CES can be divided into four groups of activities as described below. Each group of activities consists of several stages as illustrated in Figure 2.

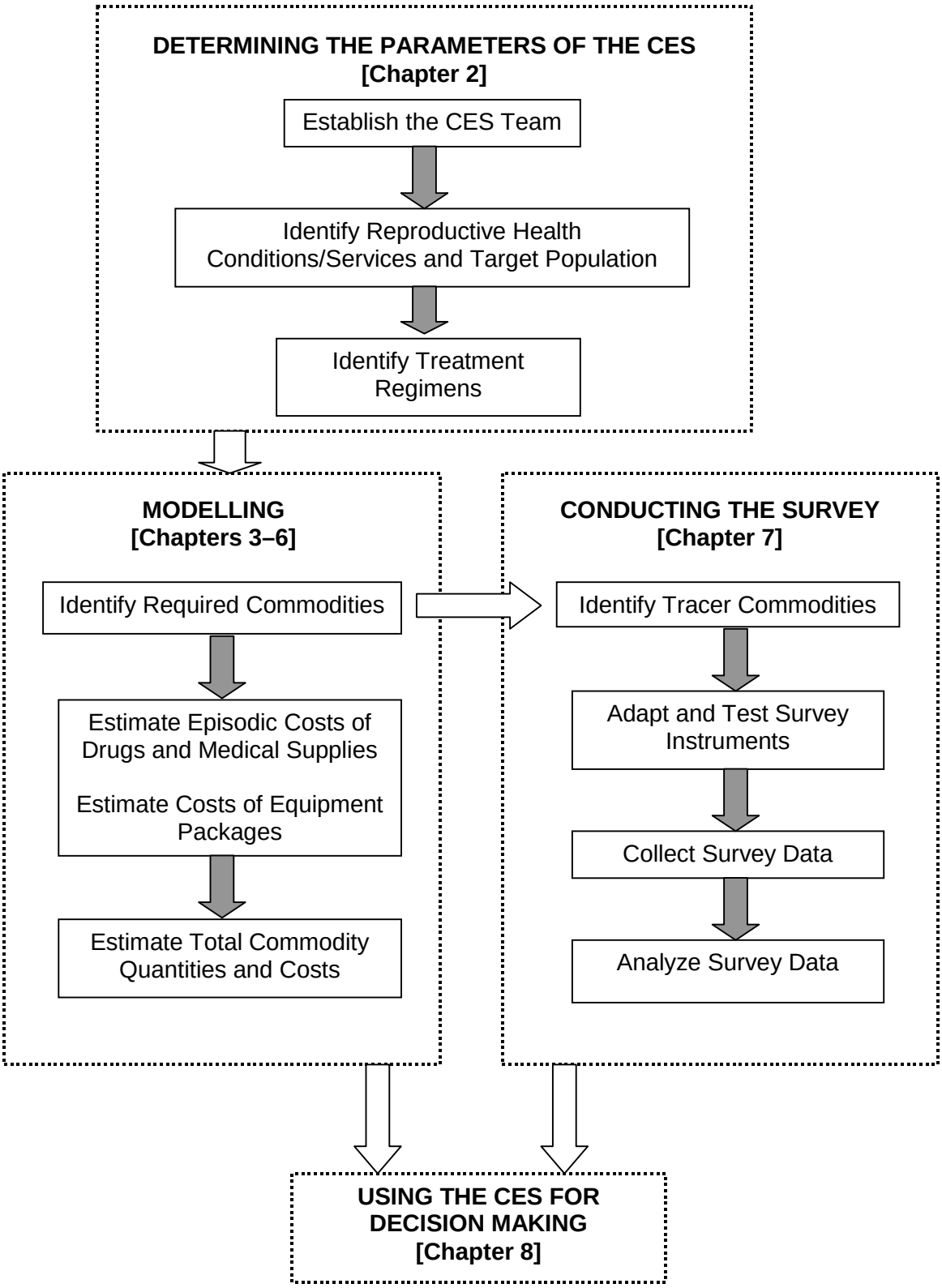
1. Determining the parameters of the CES methodology for the local situation
2. Modelling RH commodity costs (based on local STGs)
3. Conducting the CES Survey (to determine actual practice)
4. Using the CES data for decision making

The CES methodology is most effective when the costing spreadsheets (the Model) and the Survey are used together. The first tool quantifies commodity needs, logically based on the country-specific standard treatment guidelines. Because the costing exercise is premised on a number of assumptions, it is useful to check these against current practices. The CES Survey collects information about actual practices. Comparison of data generated by the CES Country-Specific Model using country-specific STGs and that based on actual practice, as provided by the Survey, provides indications of the gaps that exist between the standard and the current situation in the management of commodities for reproductive health services.

If the objectives and the resources for the exercise are limited, users can still benefit from the CES Methodology without conducting the CES Survey. For example, in developing standard treatment guidelines, the Model can be used to calculate expected commodity costs of various treatment options. The Model can also be used to assess cost implications of different scenarios for upgrading the medical equipment at health facilities.

On the other hand, if the CES Survey is to be conducted, it must be developed in conjunction with the CES Country-Specific Model. The CES Survey is designed to examine both the standards set by and the assumptions built into the CES Country-Specific Model. Therefore, it is particularly important that the key sections—such as treatment regimens and essential equipment—of the Country-Specific Model be established before the data collection instruments are finalized.

Figure 2. Framework of the Cost-Estimate Strategy



CES Implementation Team

A team approach is recommended for the successful implementation of the CES. The CES Implementation Team should consist of three to five members, who will be responsible for planning, coordinating, and implementing all aspects of the CES activities.

Skills and Expertise

Because CES encompasses the clinical, supply, financial, and policy aspects of reproductive health services, appropriate use of CES requires a wide range of skills. The most critical skills include—

- Basic computer skills with a good knowledge of spreadsheet programs
- Clinical expertise in reproductive health to be able to identify appropriate and locally feasible standards of care
- Pharmaceutical and supply management expertise
- Knowledge of operational aspects of providing reproductive health services in clinical settings
- Analytical skills for examining survey data and identifying clinical, supply, financial, and policy implications

Professional Background

The following list provides an example of the types of professionals who might serve on the CES Implementation Team.

- Drug Supply Management Specialist
- Reproductive Health and/or Maternal and Child Health Specialist
- Senior Nurse-Midwife
- Procurement Specialist
- Administrative Assistant

Field experience to date suggests that a nurse or nurse-midwife, pharmacist, and a supply manager are especially valuable on the CES team because of their technical knowledge and experience in how reproductive health commodities are actually used and supplied in the health system. This multidisciplinary team will play an important role in bringing different perspectives and potential solutions to improve reproductive health commodity management and the quality of reproductive health care. For example the team may explore—

- How reproductive health care is—and should be—provided
- Why lack of—or inappropriate use of—commodities may occur

- How the commodity supply system can support or interfere with health care providers' performance

In addition, the team members can encourage dialogues among different groups of health care professionals and policy makers. Experience shows that health professionals learning from each other through CES activities is an important element in improving commodity management and the quality and efficiency of reproductive health services.

Computer Environment

The minimum requirements are a personal computer with Microsoft Excel 97 and Word 97 and a compatible printer. Excel is essential to run the costing spreadsheet application and may also be used to store and analyze the survey data. However it is probably more efficient to utilize a data management program, such as Epi Info, to manipulate the voluminous survey data, though results can be exported into Excel for final analysis and presentation through graphs and tables.

CHAPTER 2. DETERMINING THE KEY PARAMETERS OF THE CES

Key Planning Questions

This section of the *Guide* describes the basic concepts and key decisions to be made during the stages of the CES activities. The six questions below guide the user in determining the key parameters. As described in Chapter 1, the Model development has to begin before the survey instruments are developed. Therefore, these decisions will be not only the starting points for developing the Country-Specific Model, but also the basis for designing the CES Survey.

1. Who is the target population?

2. Which reproductive health conditions and services are being evaluated?

3. At what level and how many health care facilities are being evaluated?

4. Which treatment regimens are being used for the estimation?

5. What drugs and medical supplies are needed to implement these treatment regimens, and what is the necessary quantity to complete the regimen selected?

6. What medical equipment is needed, and how will it be allocated within and between the health facilities?

Once the decision to conduct CES activities is made, the members of the CES Implementation Team should be selected as described in Chapter 1. In moving through this stage, the team members will be answering these key questions according to both the objectives of the exercise and the inputs from key stakeholders and local experts.

The team may not have complete answers to all the questions at the beginning. The process of developing a Country-Specific CES Model will help team members evaluate the assumptions and decisions necessary to answer these questions. Because the Model is developed using a spreadsheet-based application, it allows users to easily examine and compare estimated costs for a number of alternative scenarios. Data from the CES Survey enable users to assess the validity and appropriateness of the assumptions built into the CES Model.

Key Decisions

Target Populations

Depending on the objectives of the CES analysis, the team needs to decide who is the appropriate target population for the analysis and whether the team will review reproductive health commodity needs at the national, provincial, district, facility, or community level. If it is at the national, provincial, or district level, the team also has to decide whether the analysis should focus on the public sector, private sector, or both.

For example, the target population can be all women in a country, regardless of their current access to reproductive health services. The estimated commodity need that the CES can calculate in this case represents the quantity and the cost that the entire health care system has

to bear if the coverage of reproductive health service is extended to every woman in the country.

Other potential target populations include women receiving reproductive health care at health facilities in a particular sector, at government health facilities, or at health centers.

Target Reproductive Health Conditions and Services

The next question the CES Implementation Team needs to consider at this stage is which reproductive health conditions and services should be included in the review. As noted in Chapter 1, reproductive health refers to a variety of services for women, several of which—one-to-one counseling, interpersonal communication, and health education (although important)—are not included in the application of the CES because they do not require equipment or commodities.

How to identify conditions and services to be included in the analysis largely depends on the objectives of the CES analysis.

- If the team is interested in understanding the overall commodity requirements, it would be advisable to cover both preventive and curative services and to include all major types of reproductive health conditions among the target population. If the team is developing a budget for commodity needs at the facility, province, or national level, high-volume and high-cost conditions and services should be included in the analysis.

- In other instances, the team may have a more focused interest, such as sexually transmitted infections and reproductive tract infections.

Whatever the objectives of the CES analysis, each condition and service considered should be sufficiently distinct so that a treatment protocol can be assigned and the necessary commodities quantified and costed. At the same time, conditions and services should not be so detailed as to be beyond the diagnostic capacity and treatment practices at lower levels of care.

Box 2 presents an example of reproductive health services and conditions that were chosen for an actual application of the CES. Once a team has a list of conditions, it is useful to categorize them into groups. The category defined can be used in the analysis stage, especially in presenting the results in tables and graphs. In the example shown in Box 2, conditions and services were grouped into four categories.

Level of Care for Selected Conditions and Services

It is important to determine at which level of care selected reproductive health services should be provided. The level of care consideration has important implications for the supply system as well as for the training needs of various types of health care providers.

For example, in some countries reproductive health care is provided at the following three levels:

Level 1: Health posts or dispensaries in each community provide basic and limited services (e.g., antenatal care and treatment of reproductive tract infections).

Level 2: Health centers supervise several health posts, handle normal deliveries, and also provide the services offered at the health posts. They may also treat some complications and provide first aid to clients whom they refer to Level 3.

Level 3: Referral hospitals handle maternal and neonatal complications related to pregnancy and deliveries as well as the services provided at health posts and health centers.

Typically, there are policies or recommendations about the types of care that can be provided at different levels within the health care system. In these cases, the team should follow the policies. If there is no official guidance about services to be provided at each level of care, the team needs to agree how to assign *the lowest level of care* where reproductive health services are provided in the system.

Box 2.
Example of Conditions Grouped by Category

Category 1—Antenatal Care

Basic antenatal care

Category 2—Normal Delivery

Safe and clean delivery

Category 3—Treatment of Complications Related to Pregnancy

Neonatal sepsis
Puerperal sepsis
Endometritis
Mastitis
Urinary tract infection
Pre-eclampsia and eclampsia
Incomplete abortion
Dysfunctional labor
Cesarean section (C-section)
Lacerations
Postpartum hemorrhage

Category 4—Sexually Transmitted Infections

Syphilis
Gonorrhea and chlamydia
Acute pelvic inflammatory disease

Treatment Regimens

Having selected the target population, the reproductive health conditions and services, and the level of care, the team is now ready to identify the treatment regimens for each condition and service. This step marks the transition to the CES model-building stage. Step-by-step descriptions of the process are given in the Chapter 5. This section concludes by introducing some key concepts.

Standard and Actual Treatment Regimens

Two basic types of treatment regimens can be used for estimating commodity needs.

1. Ideal Standard Treatments**:** International recommended guidelines, national standard treatment guidelines, or treatment protocols at facilities are examples of ideal standard treatments. Commodity estimates based on normative guidelines represent the quantities and costs of items that theoretically should be available to meet the needs of the target population.

2. Actual Treatments**:** Actual treatment practice patterns of health care providers can be used to estimate actual commodity needs, given current practice patterns.

Both approaches are useful in quantifying and costing commodity needs for selected conditions and services. Standard treatment guidelines can be used to estimate the theoretical need for commodities, based on how the problems should be treated. Quantifying commodity needs based on actual treatment practices provides an alternative estimate, though these practices may reflect irrational use of drugs and other commodities.

The CES contains both approaches and offers two options within the first. The Normative Model estimates needs with reference to international standard treatment guidelines. The Country-Specific Model uses national or facility ideal standard treatment guidelines to calculate theoretical commodity needs. These models can then be compared with and adjusted to the findings from the CES Survey about actual treatment practices.

Average Episode

Another key concept used in the CES is the *average episode*. Although the reality of patient care at the individual level is diverse and complex, an estimation of commodity needs at the population level requires a simple model that can capture the most representative picture of how a typical case is—or should be—managed. For this purpose, the CES uses the average episode as a way to summarize a course of treatment by using the most typical treatment regimen for a selected condition in the target population. Thus, in the process of developing a Country-Specific CES Model, the CES Implementation Team seeks to identify treatment dosage and duration of treatment and specific laboratory tests for an average or typical episode of a condition in the target population.

CHAPTER 3. ESTIMATING COMMODITY COSTS—INTRODUCTION

CES Model Cost Components

One of the prime aims of the CES methodology is the accurate and systematic estimation of the quantities and costs of reproductive health commodities. Reproductive health commodities encompass drugs to treat conditions, medical supplies required to support the administration of drugs and the provision of services, and medical equipment that is essential to have available at a health facility and without which the service or treatment could not be offered.

The accuracy of the estimated costs will depend largely upon the quality of the data on product costs and target populations because the spreadsheet application can be relied upon to calculate according to tested formula. A systematic estimation is derived by identifying all the specific characteristics of a standard treatment guideline—drug formulations and dosages, frequency and duration of administration, proportion of cases to which each treatment option is applied, medical supplies required to administer chosen drugs—and by inputting this information into the CES Model.

Three components of the CES Model together assemble the costs of RH commodities. The first two components, one for drugs and the other for medical supplies, determine the episodic cost of an average treatment or service. The third component determines the cost of a set of medical equipment needed by a health facility in order to offer specific RH services adequately.

The episodic cost is multiplied by the morbidity of the RH condition and by the incidence of the RH service in the target population to derive the total drug and medical supplies costs. In the third component, the number of sets of medical equipment required at each facility and the number of facilities in the target population together determine the total costs for medical equipment.

CES Model Variants

Each of the variants—the Normative Model, the Country-Specific Model, and the Actual Model—of the CES uses the methodology outlined to derive an episodic cost and total costs of reproductive health commodities. Depending on the source of data for treatment guidelines and commodity purchase costs, alternative estimates of the total costs of reproductive health commodities can be derived. Comparison between these estimates can be used to review the cost implications of alternative treatments and the economic feasibility of national treatment guidelines and to assess the financial impact of actual treatment practice. Comparisons of the episodic costs for each condition or service based on the Normative, Country-Specific, and Actual models data can assist in improving the delivery of reproductive health services.

Normative Model

The Normative Model is premised on international treatment guidelines for reproductive health services and on commodity purchase costs from the international marketplace. Appendix B provides more detail on the derivation of international treatment guidelines. Epidemiological and service utilization data pertaining to the target population can be entered into the Normative Model to generate estimates of the costs of commodities if reproductive health services were to

be managed according to international standards and commodities were to be procured on the international market.

Country-Specific Model

The Country-Specific Model generates a different estimate by basing the calculations on local treatment guidelines, which may exist as part of health policy. In those situations where national guidelines do not exist, the application of the CES stimulates discussion and consensus on national standards because the methodology requires a "standard" to be determined in order to derive the cost estimates. This Country-Specific Model will show the costs of reproductive health commodities based on local treatment guidelines and either local or international market prices.

Actual Model

For a number of reasons, the treatments and services offered in health facilities may differ from policy or national standard practice. The CES Survey collects data on the actual prescribing practice of health professionals, the results of which can be reviewed in order to identify the average actual treatment practice. Commodity purchase costs may also vary between centralized and decentralized systems. The Actual Model derives the cost of reproductive health commodities, given "real-life" treatment practices and purchase costs.

CES Spreadsheet Application

The Excel spreadsheet file consists of a number of spreadsheets, most of which are blank and require data entry by the user, and some of which have data pre-installed. The sheets are linked by macros, lookup tables, and formulas in order to facilitate data entry, automate calculations and the transfer of results to summary tables, and manage pre-set printing functions.

On opening the Excel CES file, a message window appears with information about macros and viruses. Click on the "Enable Macros" button to proceed with loading the file into Excel. The spreadsheet will not function properly unless this option is selected.

The application consists of the following sheets:

- Homepage

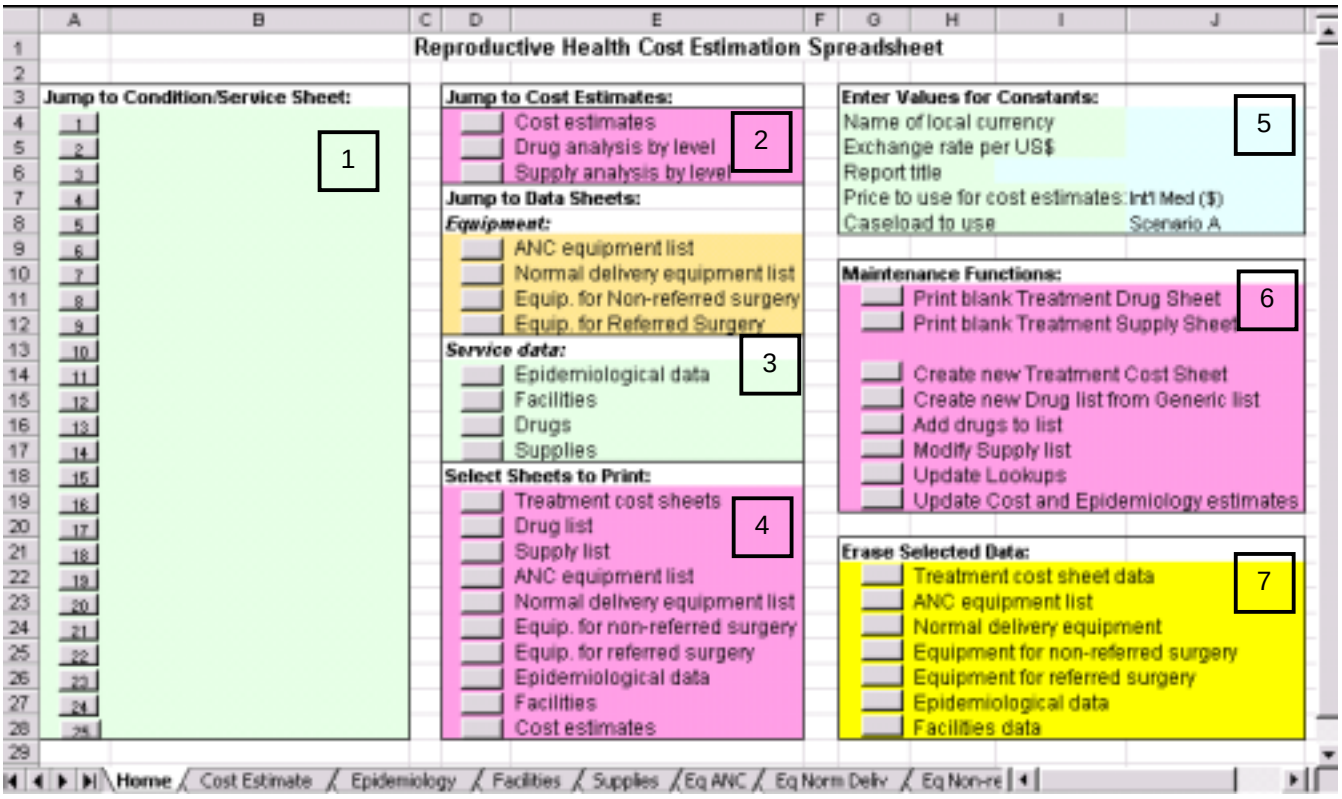
- Data Entry Sheets
  - Epidemiology and Service Utilization Estimates
  - Health Facilities
  - Medical Supplies List
  - Medical Equipment (4 options)
  - Drug List
  - Lookups
  - Treatments (15 sheets pre-installed)

- Results Sheets
  - Cost Estimate Summary
  - Supplies by Level
  - Drugs by Level
  - Graphs

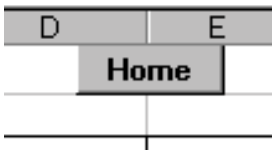
- Reference Sheet
  - List of Generic Drugs

The Homepage (see Figure 3) contains buttons that enable the user to move directly to the selected sheet, to print selected sheets, and to initiate specific maintenance functions.

Figure 3. CES Model Homepage



At the top of each worksheet there is a gray button labeled “Home,” which when clicked returns the user to the Homepage.



Move the mouse to point to the button, wait for the hand icon to appear, and click.

Homepage Activities

The Homepage is the locus of a number of shortcuts that facilitate utilization of the CES spreadsheet tool through navigational buttons, buttons that activate macros to update or manage the data entered, or handle printing requirements. There are seven parts to the Homepage (as shown in Figure 3).

1. Navigation to Treatment Cost Sheets

This section is headed *Jump to Condition/Service Sheet* and contains 25 numbered buttons, which move the user directly to a specific Treatment Cost Sheet when clicked. The names of the conditions or services selected for the CES exercise appear in Column B after entry into Cell A1 of each Treatment Cost Sheet (see Figure 12) and clicking on the "Update Cost and Epidemiology estimates" button. Any changes to the name made in the Treatment Sheet will also be reflected here following further updating. Do not type directly into Column B. Note that clicking on a button with a figure higher than the number of Treatment Cost Sheets displayed will have no effect.

2. Commodity Cost Sheet

The Cost Estimate Sheet will contain a summary of the results of the costing exercise following complete data entry. Clicking on the button "Cost estimates" in the *Jump to Cost Estimates* section accesses this data sheet directly.

3. Data Sheets

The principal data entry sheets are accessed from the section headed *Jump to Data Sheets* (sheets for Medical Equipment, Epidemiology, Facilities, Drugs, and Supplies).

4. Automatic Printing

Key results sheets and data storage sheets can be printed by clicking the appropriate button in the *Select Sheets to Print* section.

5. Options for Presenting Cost Information

The *Enter Values for Constants* section enables the user to select between the options for presenting the cost information (in local currency, local currency converted to US$, and in international prices in US$) and to select the caseload. The user also enters text for the report title (which may be used to identify the scope of the CES exercise or the user) and specifies the currency of the cost data in this section.

6. Maintenance Functions

Procedures to facilitate the preparation of the Treatments Cost Sheets, manage the drug and supply lists and lookup tables, and update the calculations following entry or amendment of data are accessed from buttons in this section.

7. Data Erasure

The Model automatically erases information input to a number of data entry sheets at the click of a button. This feature facilitates further application of the CES by, for example, enabling the user to change the caseload data to provide an estimate for a new target population, while maintaining the standard treatment guidelines and cost information already entered. This programming also safeguards the embedded formula and macros from inadvertent deletion by the user.

Warnings

Entering Data

In general, data is entered only in light blue-shaded cells. White cells contain formulas that should not be overwritten (otherwise the calculations and the macros that automate several functions of the spreadsheet model will not function properly). Yellow-shaded cells also contain formulas, but, because of space limitations, it may be necessary to overwrite the formula in certain circumstances. Amendments can be made without interfering with the automatic spreadsheet functions in these yellow-shaded cells.

Sheet Tab Names

The abbreviated names on the sheet tabs should not be changed. Macros that rely upon sheet tab names for referencing data will not function if existing sheet tab names are amended. This limitation does not, however, apply to the Treatment Cost Sheets.

Extracting Drugs from the List of Generic Drugs

The List of Generic Drugs is pre-installed in the spreadsheet file to facilitate accurate preparation of the list of drugs needed for the reproductive health conditions and services being reviewed. Extracting drugs from the List of Generic Drugs can only be performed once. Therefore as full a list of required drugs as possible should be assembled manually (see Chapter 5, Step 1) before preparing the list of drugs from the List of Generic Drugs.

Note: After entering data or amending information, update the application by clicking on appropriate buttons to ensure that data transfer and results tables take account of the changes made. This updating is very important to ensure that the correct information is displayed and printed.

CHAPTER 4. ESTIMATING COMMODITY COSTS—THE NORMATIVE MODEL

How to Use the Normative Model

The electronic file of the Normative CES Model is provided on the diskette that accompanies this *Guide*. Before making any changes to the data in the Normative Model, **copy the file to the hard drive of the computer or to another diskette.**

The Normative Model, as provided, shows users the estimated average episodic costs of drugs and medical supplies based on international treatment guidelines and commodity prices from the international market for 17 conditions and services, grouped into five categories—

- Antenatal Care
  - Antenatal care
- Safe and Clean Delivery and Postpartum Care
  - Safe and clean delivery
- Maternal and Neonatal Infections Related to Pregnancy and Delivery
  - Neonatal sepsis
  - Maternal Sepsis
  - Endometritis
  - Mastitis
  - Urinary tract infection (UTI)
- Other Complications Related to Pregnancy and Delivery
  - Severe pre-eclampsia and eclampsia
  - Complications of incomplete abortion
  - Dysfunctional labor
  - Lacerations
  - C-section for obstructed labor and other indications
  - Postpartum hemorrhage
- Reproductive Tract Infections
  - Syphilis
  - Gonorrhea
  - Chlamydia
  - Pelvic inflammatory disease (PID)

The 16 Treatment Cost Sheets (gonorrhea and chlamydia are treated identically) and the Drug and Supply Lists, which contain all the drugs and medical supplies required by the treatment guidelines, can be found in Appendix B.

Four medical equipment packages are defined and an estimate of each package cost is developed in the Normative Model—Health Worker Equipment Package, Delivery Room Equipment Package, Non-referred Surgical Equipment Package, and Referred Surgical Equipment Package. The contents of these packages and costs can be found in Appendix B.

Users can refine the treatment cost estimates by modifying the parameters of the Normative Model to account for certain local factors.

- Treatment Patterns—If the percentage of cases managed by alternative treatments is different in the local setting from that proposed in the international guidelines, then appropriate amendments can be made to the treatment sheets. (This affects 5 of the 17 conditions and services—Antenatal Care, Maternal Sepsis, Mastitis, Gonorrhea/Chlamydia, and Postpartum Hemorrhage.)

- Epidemiology and Service Utilization Patterns—The Normative Model does not contain epidemiological or service utilization data. Local information must be input in order to generate total commodity costs.

- Number of health facilities—Inputting data on the number of health facilities will enable the Normative Model to generate the total costs of medical equipment.

- Local commodity prices

Changing the Percentage of Cases Treated in the Treatment Sheets

Users can refine the commodity costs estimated by the Normative Model by changing the percentage figures that they think most accurately reflect the treatment patterns common in their own settings, based on the available data or best estimates. Notice how the Average Episodic Drug and Supply Costs shift as the % Cases Treated changes. See Chapter 5, Step 8, for instructions on how to enter data in the Treatment Sheets.

Completing the Epidemiology and Service Utilization Estimate Sheet

By entering the caseload data in the Epidemiology and Service Utilization Estimate Sheet of the Normative Model, users can calculate total estimated costs of drugs and medical supplies for the target population. This sheet, as it is provided in the attached diskette, does not have any data. See Chapter 5, Step 9, for instructions on how to complete the Epidemiology and Service Utilization Estimate Sheet.

Estimating Total Medical Equipment Needs

Users can refine medical equipment needs estimated by the Normative Model in two ways. First, entries in the Medical Equipment Sheets can be changed so that the content of each package can be redefined to meet local needs. For example, the number of items in each package can be adjusted. In addition, new items can be added to the equipment package or some items can be deleted.

Second, users can calculate estimated total medical equipment costs by completing the Health Facility Sheet. Depending on how the reproductive health system is organized in the user's country, the level of facilities and the number of equipment packages necessary can be adjusted. See Chapter 5, Step 6 and Step 10, for more information about how to enter equipment-related data in the Model.

Entering Local Prices

The CES Model can store up to two price data sets. The Normative Model already contains the international commodity prices. Users can add local prices for the commodities included in the Model so that they can calculate drug and supply costs to implement international treatment guidelines, using the commodities purchased locally, and compare them with figures based on the international prices. See Chapter 5, Step 7, for more information.

CHAPTER 5. ESTIMATING COMMODITY COSTS—THE COUNTRY-SPECIFIC MODEL

The Country-Specific Model will provide cost information based on the reproductive health conditions and services to be reviewed and the target population as decided by the CES Implementation Team. These parameters must be determined before proceeding with the development of the model.

Stages and Steps for Developing the Model

This chapter provides step-by-step instructions for building a Country-Specific CES Model using the template included with this *Guide*. The process is divided into a number of steps, which are carried out in three stages. The first stage prepares the reference data that will be accessed by the Treatment Cost Sheets. The second stage develops the episodic cost (using the treatment worksheets) and enters data on the morbidity of RH conditions and the incidence of RH services to derive the total costs of commodities for the target population. The third stage obtains the results of the modeling.

Stage 1—Setting Up the Model

Step 1: Manually Complete the Treatment Sheets
Step 2: Initially Prepare the Excel Workbook
Step 3: Electronically Prepare the Treatment Sheets
Step 4: Set up the Drug List
Step 5: Set up the Supply List
Step 6: Set up the Medical Equipment Lists
Step 7: Collect and Enter the Commodity Costs

Stage 2—Entering the Data in the Model

Step 8: Enter Data into the Treatment Sheets
Step 9: Estimate and Enter Caseload Data
Step 10: Estimate Total Medical Equipment Needs at Health Facilities

Stage 3—The Results

Step 11: Estimates of the Episodic Cost of Drugs and Supplies for Each Condition or Service
Step 12: Estimates of Total Drug and Medical Supply Requirements and Costs
Step 13: Estimates of Total Medical Equipment Requirements and Costs
Step 14: Analyses of Drugs by Level and Supplies by Level

This chapter is designed to be used in conjunction with the CES Model template provided with this *Guide* as an electronic file named CES MODEL TEMPLATE (.xls). This file should be used as the source file for each application of the CES and should not be modified. Before proceeding to the rest of this chapter, **copy the template file from the diskette to the hard drive of the computer or to another diskette** so that you work with a copy of the original. Rename the copied file (on the hard drive or duplicate diskette) or open the file in Excel and "Save As" with a new name. On opening the Excel CES file, a message window appears with information about macros and viruses. Click on the "Enable Macros" button to proceed.

Stage 1—Setting Up the Model

Step 1: Manually Complete the Treatment Sheets

Building Consensus on Standard Treatment Guidelines

The CES Model is designed to identify and quantify commodity needs based on the treatment regimens selected for the conditions under review. Therefore, it is essential that there is consensus within the CES Implementation Team on the specification of each regimen. Ideally, standard treatment guidelines established by national policy should be used. Identifying treatment regimens can be more complicated when there is no established treatment norm available in the setting in which the CES activities take place—for example, in a particular country, province, or health facility. Under these circumstances the team may refer to national or facility practice or to international treatment guidelines to identify regimens to be incorporated into the Model.

All commodity items—medical supplies as well as drugs—needed to carry out the standard treatment guidelines must be identified and quantified in order to derive useful cost estimates. Typically, however, treatment guidelines do not provide sufficiently detailed information to meet the data requirements of the CES Model, especially in terms of medical supplies and equipment.

It is, therefore, an important task of the team during the consensus-building process to collect supplemental information regarding the treatment regimen in order to meet the data requirements for the CES Model. The team may consult local experts (e.g., OB/GYN doctors and nurses), and it would also be useful for team members (especially those with a nursing or midwifery background) to visit health facilities and observe actual practices.

It is suggested that the team undertake the following tasks (the printed-out Treatment Sheet will facilitate this process, see Figures 5 and 6):

1. If the Model is to be built based on existing treatment guidelines, identify treatment regimens recommended by the guidelines for each target condition. Start filling in the Treatment Sheet printout for each condition with appropriate information provided in the guidelines. For now, leave blank those cells for which the guidelines do not provide information.

2. If there are no guidelines available, distribute blank Treatment Sheet printouts to the clinicians (or persons with appropriate knowledge) supporting the team and ask them to complete the form based on what they think the treatment norms should be.

3. Collect the sheets and hold *consensus meetings* to identify information gaps and differences between treatment norms proposed by clinicians and to reach agreement.

4. Based on the agreements reached at the consensus meetings, revise the Treatment Sheet manually. Distribute the revised sheets to the same people who attended the consensus meetings.

Repeat tasks 3 and 4, as necessary, until consensus is reached on treatment regimens for all target conditions.

Printing Out the Treatment Sheet

The Treatment Sheet is a one-page summary of drugs and medical supplies necessary to complete the treatment regimen selected. A Treatment Sheet needs to be developed manually for each condition or service selected for analysis. The sheet is divided into the drug section and the supply section (Figures 5 and 6), and the two sections can be printed separately.

These blank sheets are parts of the drug and medical supply sections of the Treatment Sheet in the CES Model. They correspond to the range of cells of the Treatment Sheet in the electronic file into which the user enters data in Stage 2 of the CES Model building.

To print out the blank drug and supply sections of the Treatment Sheet, go to the Homepage and click the "Print Blank Treatment Drug Sheet" and "Print Blank Treatment Supply Sheet" buttons under *Maintenance Functions* (Figure 4). The print preview screen will display the blank sheets. From this screen, select "print." The forms may also be obtained by clicking on the "Print Drug" and "Print Supply" buttons on the template sheet (see figures 5 and 6).

Figure 4. Print Blank Treatment Sheets from the Homepage

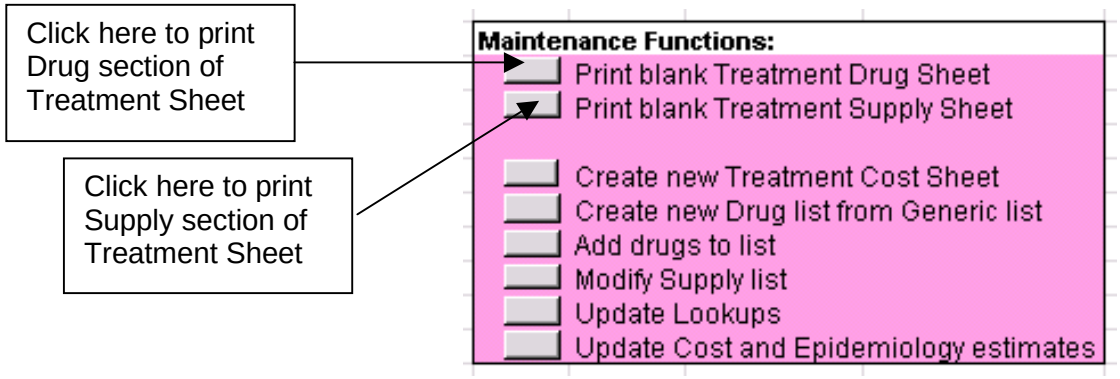


Figure 5. Blank Treatment Drug Sheet

Treatment Name:										*Rx Category:*
Note	Level of Care	Drug	Route	Treatment Dose		Unit	Times/ Day	# Days	% Cases Treated	Drug Formulation
Source:										
Notes:										

Figure 6. Blank Treatment Supply Sheet

Note	Level of Care	Supply Item	Name of Associated Drug(s) (if IM or IV)	Quantity/ Admin.	# Admins.	Total Quantity	% Cases Treated	Dispensing Unit
Source:								
Notes:								

Components of Treatment Sheet Printout

Brief descriptions of each column of the printout sections (drug section and supplies section) of the Treatment Sheet are provided below, with some instructions for filling in appropriate information. The same descriptions apply to the electronic version of the Treatment Sheet. How to enter the data using the computer is described in Stage 2: Entering the Data in the Model.

The Treatment Name and Category are entered in the first row of the form. To facilitate analysis of the cost results, the set of conditions and services selected for review can be grouped by a common theme—for example, Treatment of Complications might include Lacerations, Episiotomy, and Hemorrhage. The list of groups or categories determined at this stage will be entered into the Excel file later in the process (see Step 2: Initially Prepare the Excel Workbook).

The Treatment Sheets in the electronic workbook contain 20 rows for drugs and 26 rows for medical supplies in which data may be entered. The number of rows is therefore restricted to 20 and 26, respectively, in the printed Treatment Drug Sheet and Treatment Supply Sheet.

Figure 7a displays the drug section of a manually completed treatment sheet; Figure 7b shows the supply section of a manually completed supply sheet. (See also Appendix B.)

Drug Section

Note (Column A)

Notes provide users with space to keep information regarding selected treatment regimens. For example, there may be multiple treatment options for one condition depending on the sensitivity of organisms to antibiotics. It is useful to provide a descriptive note for each option; for example, under the condition Maternal Sepsis, there can be postpartum sepsis and postabortion sepsis. Noting key descriptions of selected treatments in this column is highly recommended.

Level of Care (Column B)

This column indicates *the lowest level of facility* where the listed treatment option is provided. Level 1 refers to the lowest level of facility in the system, and the level number increases for each higher level of facility. For example, in some situations—

Level 1 might mean health post or dispensary
Level 2 might mean health center
Level 3 might mean hospital

A particular condition may be treated by first aid at Level 1 (or Level 2), but if the condition is serious (for example, requiring hospitalization), the woman needs to be referred to Level 3 for the management of the condition. The CES Model is programmed to analyze the quantities and costs of drugs and medical supplies by level of care, though this function will only be accurate if the parameter is identified for all items and treatment options.

Drug (Column C)

List drugs by their generic names or their international nonproprietary names (INN). If the same drug is prescribed in more than one treatment option for a condition, it is advisable to list this drug separately under each option to avoid confusion and possible counting mistakes. (See Figure 7a.)

Route (Column D)

The route is the method of administration for the drug. The table below lists codes that are already set up in the Excel template file accompanying this *Guide*. The use of this coding system will make data entry and analysis easier at a later stage.

Code	Description
DROP	Oral drops
INH	Inhaler
INJ	Injectables
IV	Intravenous
IM	Intramuscular
NASAL	Nasal drops
OPHT	Eye preparation
OTIC	Ear drops
PO	Oral preparation
RECT	Rectal preparation
SC	Subcutaneous
TOP	Topical
VAG	Vaginal preparation

Treatment Dose (columns E/F)

In the CES Model, treatment dose should be recorded in two separate columns for *amount of drug per administration* and the *unit* in which the dose is dispensed. For example, describing 20 mg, 20 is the amount of drug per administration, and mg is the unit of the dose. When the data are entered into the Model using the spreadsheet template, it is important to keep the numeric and text information separately in two columns so that the embedded formula can recognize the numeric information and use it in the calculations (see Figure 7a).

Unit (Column G)

Unit refers to *the smallest unit in which a drug is given to patients*. For example, for ampicillin in oral form, the unit is a tablet. As in the case of route, the CES Model has a coding system for “unit.” The use of a systematic coding system will ensure consistent data entry and facilitate analysis.

Code	Description	Code	Description
AMP	Ampoule	SACH	Sachet
APPL	Application	STRP	Strip
BOT	Bottle	SUPP	Suppository
CAP	Capsule	TAB	Tablet
DOS	Dose	TUBE	Tube
INHL	Inhaler	UNIT	Unit
JAR	Jar	VIAL	Vial
PESS	Pessary		

Times/Day (Column H)

The number of times a day the drug is administered is written in column H. For example, in Figure 7a Postpartum Sepsis (Level 3), the woman receives ampicillin through IV/IM four times a day and gentamicin three times a day.

 # Days (Column I)

The duration of the course of treatment for an average episode is shown in number of days. For example, in Figure 7a Postpartum Sepsis (Level 3), the woman is sick enough to require hospitalization and receives ampicillin through IV/IM for four days after which she can switch to oral medication (tablets for six days). Similarly, for hydration, the patient receives 1,000cc IV fluids on day one, then three liters per day for four days (and then should be well enough for oral fluids).

> ✍ **Note:** If the purpose of the CES activity is to quantify the commodity needs for the care provided at facilities, and if a facility is going to provide only a portion of the full treatment because the patient is expected to fill a prescription outside the facility, then count the number of days for the amount that the facility will provide.

% Cases Treated (Column J)

The CES Model estimates commodity costs by taking into account the relative occurrence of various treatment options in treating the condition among the target population. Of those patients coming to the health facilities, the proportion who are treated with a particular treatment option needs to be estimated and entered here. For example, if all patients receive a particular treatment, the *Percentage Cases Treated* by the drug would be 100 percent. The percentage should be assigned to all treatment options or tests, based on the data or best estimates. In Figure 7a, it has been estimated that 90% of maternal sepsis cases are postpartum and 10% are abortion-related.

Drug Formulation (Column K)

This column contains information on the preferred dosage or strength of a unit of the each drug included in the Treatment Cost Sheet. For example in Figure 7a, the treatment dose for ampicillin is 3,000mg (taken once for a single day). Tablets are

available containing either 250mg or 500mg of ampicillin, with the latter being the strength selected in this STG.

Medical Supply Section

Note (Column A)

Descriptions in the Note should correspond with those in the Drug Section. List as a group all medical supplies that are used for a specific treatment regimen. Descriptions of recommended tests should also be noted in this column.

Level of Care (Column B)

See description in the Drug Section.

Supply Item (Column C)

Names of individual supply items should be listed here. If there is more than one size or specification for any items that make a difference in the price (e.g., “2cc” and “5cc” syringes), give descriptions for the size and type of the appropriate items as part of the item name.

Name of Associated Drug(s) (columns D–F)

This column is intended to help CES users match the name and the quantity of medical supply items with the names of injectable drugs. When more than one injectable drug is listed in the drug portion of the Treatment Sheet, it can be extremely confusing to accurately count and list the quantity of all different types of supply items with various administration schedules.

Example: Figure 7b shows the medical supply section of the Treatment Sheet for Maternal Sepsis. Compare this with the drug section (Figure 7a) which lists injectable antibiotics four times (under Postpartum and Postabortion cases).

Both ampicillin and gentamicin are included in the first line therapy at the referral hospital level for 4 and 10 days, respectively. A 2cc syringe and needle are necessary to administer each dose of ampicillin and gentamicin. In the medical supply portion of the Treatment Sheet, therefore, “2cc syringe and needle” is listed four separate times—for both drugs, ampicillin and gentamicin, and for both treatment options.

Figure 7a. Manually Completed Drug Section of Treatment Sheet

A	B	C	D	E	F	G	H	I	J	K
Treatment Name:		*Maternal Sepsis*				**Category:**	*Treatment of Complications*			
Note	Level of Care	Drug	Route	Treatment Dose		Unit	Times/ Day	# Days	% Cases Treated	Drug Formulation
Postpartum										
First aid	*1*	*Ampicillin*	*PO*	*3000*	*mg*	*Tab*	*1*	*1*	*90%*	*500mg tab*
	3	*Ampicillin*	*IV/IM*	*500*	*mg*	*Vial*	*4*	*4*	*90%*	*500mg vial*
	3	*Ampicillin*	*PO*	*500*	*mg*	*Tab*	*4*	*6*	*90%*	*500mg tab*
	3	*Gentamicin*	*IV/IM*	*80*	*mg*	*Amp*	*3*	*10*	*90%*	*40gm/ml amp*
	3	*Metronidazole*	*PO*	*500*	*mg*	*Tab*	*4*	*10*	*90%*	*250 mg tab*
Initial	*3*	*Normal saline*	*IV*	*1000*	*ml*	*Bottle*	*1*	*1*	*9%*	*1000ml bottle*
	3	*Normal saline*	*IV*	*1000*	*ml*	*Bottle*	*3*	*4*	*90%*	*1000ml bottle*
Postabortion										
First aid	*1*	*Ampicillin*	*PO*	*3000*	*mg*	*Tab*	*1*	*1*	*10%*	*500mg tab*
	3	*Ampicillin*	*IV/IM*	*500*	*mg*	*Vial*	*4*	*4*	*10%*	*500mg vial*
	3	*Gentamicin*	*IV/IM*	*80*	*mg*	*Amp*	*3*	*4*	*10%*	*40gm/ml amp*
	3	*Metronidazole*	*PO*	*500*	*mg*	*Tab*	*4*	*4*	*10%*	*250mg tab*
Initial	*3*	*Normal saline*	*IV*	*1000*	*ml*	*Bottle*	*1*	*1*	*10%*	*1000ml bottle*
	3	*Normal saline*	*IV*	*1000*	*ml*	*Bottle*	*3*	*4*	*10%*	*1000ml bottle*
On discharge	*3*	*Doxycycline*	*PO*	*100*	*mg*	*Tab*	*2*	*14*	*10%*	*100mg tab*
Source:										
Notes:	*Assumes the patient is sick enough to need hopitalisation.*									

Quantity/Admin. (Column G)

Quantity per Administration is the quantity of supply items that is used to implement a procedure or treatment *once*, and it is expressed as the number, or proportion, of the **Supply Unit**.

Example 1: If four pairs of sterile gloves are necessary for normal delivery and if they are supplied and priced by pair, the *quantity per administration* is 4.

Example 2: If cord ties are supplied in rolls of 100 metres and it is estimated that on average 20cm is used during one delivery, the quantity per single service is 0.2/100, or 0.002.

 # Admins. (Column H)

In this column, enter the total number of administrations of the procedure needing the supplies during the course of treatment for an average episode.

Example 1: One syringe and one needle are required for each dose of IV medication.

Example 2: If drainage for mastitis is to be done twice during the average course of treatment, then the number of administrations is 2.

% Cases Treated (Column J)

The purpose of this column is the same as that in the Drug Section—to take into account the relative frequency of various supply items required to implement multiple treatment or laboratory test options. For medical supplies that are used to administer drugs listed in the drug portion of the Treatment Cost Sheet, the Percentage of Cases Treated for each item should be the same as that for the corresponding drug.

Example 1: If 20 percent of cases receive the second line treatment with one injectable drug, the % Cases Treated for supply items necessary for the injection (e.g., syringe and needle) should also be 20 percent.

Example 2: If episiotomy is performed on average in 25 percent of deliveries, the % Cases Treated for supply items, such as sutures, to be used in the procedure should also be 25 percent.

For supplies for laboratory tests, the percentage should reflect the estimated need or the policy for certain tests in accordance with the recommendations.

Example 3: If urinalysis is to be conducted for all women at their first antenatal care visit, the % Cases Treated for urine dipstick should be 100 percent.

Dispensing Unit (Column K) The dispensing unit is the proportion of the Pack Size that is required for the average administration of the treatment. For example, one 2cc syringe is needed to inject one dose of an antibiotic and if syringes are purchased in boxes of 25, then the Dispensing Unit is 1/25 or 0.04.

> ✍ **Note:** The Total Quantity column (I) need not be manually completed because formulas in the spreadsheet will automatically calculate this when data are entered into the electronic treatment sheet.

Figure 7b. Manually Completed Supply Section of Treatment Sheet

A	B	C	D	E	F	G	H	I	J	K
Treatment Name:		*Maternal Sepsis*				*Category:*	*Treatment of Complications*			
Note	Level of Care	Supply Item	Name of Associated Drug(s) (if IM or IV)			Quantity/ Admin.	# Admins.	Total Quantity	% Cases Treated	Dispensing Unit
Postpartum	*3*	*2cc syringe and needle*	*Ampicillin*			*1*	*16*		*90%*	
	3	*2cc syringe and needle*	*Gentamicin*			*1*	*30*		*90%*	
	3	*IV set*	*Normal saline*			*1*	*3*		*90%*	
Postabortion	*3*	*2cc syringe and needle*	*Ampicillin*			*1*	*16*		*10%*	
	3	*2cc syringe and needle*	*Gentamicin*			*1*	*12*		*10%*	
	3	*IV set*	*Normal saline*			*1*	*3*		*10%*	
Source:										
Notes:										

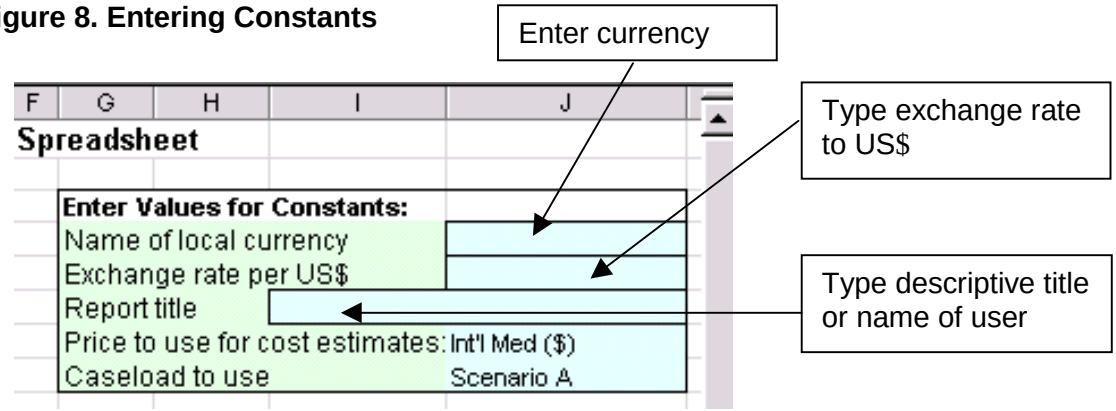
Step 2: Initially Prepare the Excel Workbook

Homepage

The Homepage contains a section called *Enter Values for Constants* in which to record information to describe the analysis and data contained in the Excel file and to specify the currency of the cost data (Figure 8). Enter information directly into the cells in this section. This section is usually the only area of the Homepage where the user will input information.

The descriptive phrase (which may also be used to identify the user or the scope of the CES exercise) and the name of the currency used will appear in printed reports. This information is entered in the *Enter Values for Constants* section in the line titled "Report title."

Figure 8. Entering Constants



Prepare Lookup Data Sheet

The coding and validation tables used to facilitate data entry into the Treatment Sheets reside on the Lookup Data Sheet. Each list contains either a range of acceptable values for specific fields, either pre-set or user-defined, from which the user selects when entering data (highlighted in blue on the Lookup Sheet). The tables ensure that certain data are consistently entered. Tables for the Route (Column A) and for the Unit (Column I) of the drug are pre-installed, but may be amended. Ranges for other lists have been established for descriptions for the caseload choices (Column C), Treatment Categories (Column E)—both user-defined, and options for how to display the cost information (Column G). See Figure 9.

To add additional or amend existing values, click on the "Update Lookups" button in the *Maintenance Functions* section of the Homepage or select the Sheet tab "Lookup." Additional options must be typed within the blue ranges to be operational. If any existing data are deleted, the remaining list must not contain any blank cells. Move or copy data to maintain a continuous list of data.

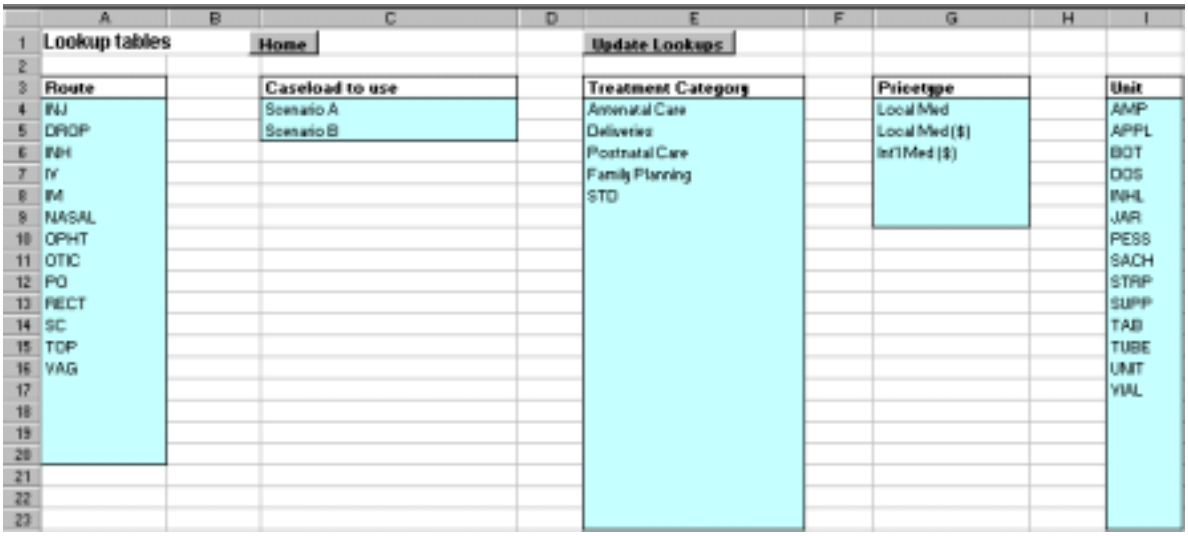
If you are using the CES to develop two estimates of the costs of RH commodities based on different target populations, type a short description for each scenario into Column C. For example, you may wish to determine costs for all RH services in the country and for services provided in public facilities only. These descriptions automatically appear as headings in a number of other sheets in the workbook.

In column E, type the names of the treatment categories or groupings that you will use for analysis and presentation purposes. While the caseload names can be entered at any time, the

treatment categories should be entered at this step so that they are available when the Treatment Sheets are set up in Step 3.

> **Note:** After adding or amending information in the Lookup sheet, update the lookup tables by clicking the button "Update Lookups" (see Figure 9).

Figure 9. Lookups



Click on the "Home" button to return to the Homepage.

Step 3: Electronically Prepare the Treatment Sheets

While the clinicians are generating the treatment information as described in Step 1, the CES Team coordinator or the pharmacist member of the team should start preparing the Treatment Cost Sheets on the computer screen.

> **Note:** The CES MODEL TEMPLATE file must be copied from the enclosed diskette to the computer. Do not work directly on the diskette file provided. Keep it as the source file.

Delete Unnecessary Treatment Sheets

The template file contains 15 Treatment Cost Sheets ready for data entry. Should the team decide upon a smaller number of target conditions and services for the analysis, it is necessary to delete the superfluous Treatment Sheets. Deleting unneeded sheets enables the embedded macro commands to function properly so that the Model can correctly copy data from Treatment Cost Sheets to summary tables, such as the "Epidemiology and Service Utilization Estimate Sheet" and "Cost-Estimate Summary."

Delete each sheet manually. Follow these steps:

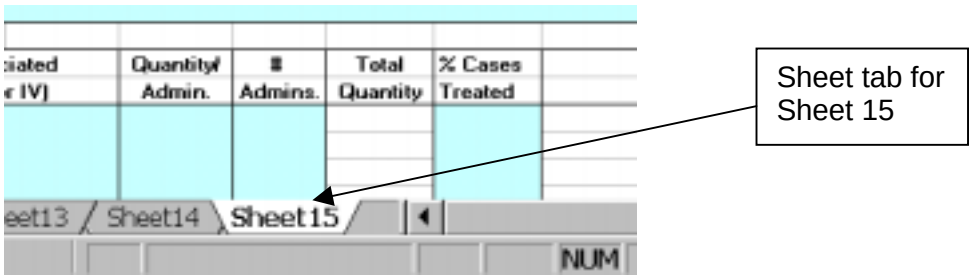
1. Choose the sheet to delete by clicking on the **Sheet tab** at the bottom of each sheet on the Excel screen (see Figure 10).

> **Note:** Delete superfluous sheets starting with the highest numbered one (15), then the next highest (14), and so on, until the required number of sheets remains.

2. Go to "**Edit**" in the Excel Command menu and select "**Delete Sheet**." Click OK to confirm the deletion.

3. Repeat steps 1 and 2 for all unused sheets.

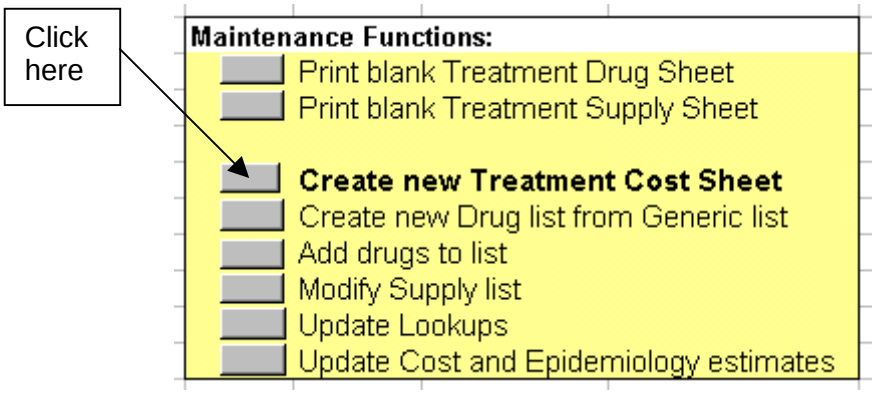
Figure 10. Sheet Tab Example of Sheet 15



Add New Treatment Sheets

New Treatment Cost Sheets can be inserted if more than 15 conditions and services have been included in the CES exercise or, if after deleting Treatment Sheets, further conditions and services are added to the analysis. On the Homepage, choose the *Maintenance Functions* button "Create new treatment cost sheet" (Figure 11).

Figure 11. Maintenance Function Button for Creating New Treatment Cost Sheet



Set Up the Treatment Sheets

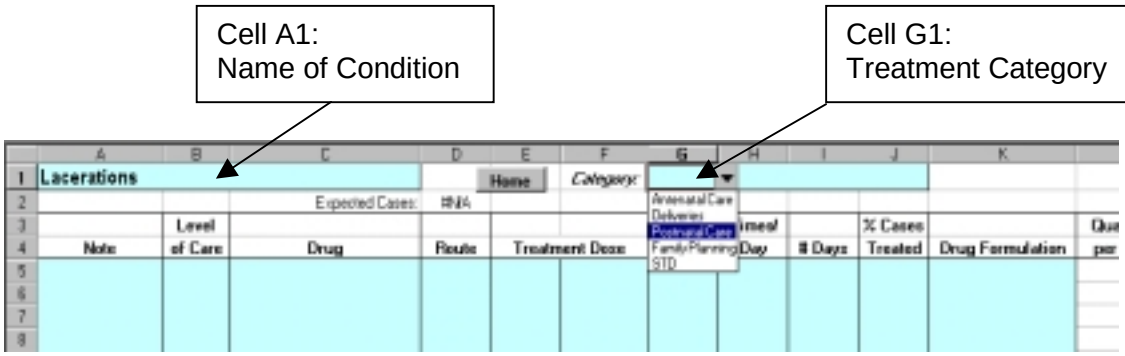
Once the exact number of Treatment Cost Sheets have been set up, they can be prepared for data entry. The results of the cost estimation for each treatment will be displayed in the summary sheets in the same order as the sheets themselves. It is recommended that all the conditions within one treatment category be entered on sequential sheets, then all the conditions for a second category, and so on for all categories. This grouping will make managing and reviewing the CES spreadsheets easier.

1. Enter the name of the conditions or services, identified by the CES Team in Step 1 (Manually Complete the Treatment Sheets), in **Cell A1** of each sheet.

2. Choose the name of the treatment category in **Cell G1** by using the lookup window. Click the cursor on Cell G1, then click on the arrow button which appears and select from the drop-down list (Figure 12). This is the list the user prepared in the Lookups sheet.

3. After completing the name and category entry on all treatment sheets, this information is transferred to the Homepage, the Cost Estimate Summary sheet, and the Epidemiology and Service Utilization Sheet by clicking on the "Update Cost and Epidemiology estimates" button in the *Maintenance Functions* section of the Homepage.

Figure 12. Enter the Name of Condition and Treatment Category on Each Treatment Sheet



Note: It is possible to add or delete treatment cost sheets subsequent to entering information into data sheets in the workbook (as described in steps 8 and 9). After adding or deleting sheets, it is necessary to update the list of conditions. Click the "Update Cost and Epidemiology estimates" button in the *Maintenance Functions* section of the Homepage.

Step 4: Set Up the Drug List

The CES Model uses the **lookup function** for entering the names of drugs and supply items rather than typing into the cells of the Treatment Sheets. The lookup function reduces the chance of data entry mistakes and thus the risk of breakdown in the linkage of information across various parts of the CES Model.

At this step, the user prepares a **Drug List** by customizing the **List of Generic Drugs.** The List of Generic Drugs is pre-installed in the template file and contains more than 450 entries. The Drug List is a working list, created by transferring information about the drugs selected from the List of Generic Drugs. Ideally, the Drug List contains only those items identified in the selected treatment guidelines and, therefore, it will be shorter and more easily managed than the List of Generic Drugs. To facilitate the entry of drug names in the Treatment Sheets (described in Step 8), a drop-down menu appears with a list of drug names. The source of the information for the drug drop-down menu is the Drug List.

Three tasks need to be completed to create a Drug List:

1. Select drugs from the List of Generic Drugs.

2. Transfer the information from the List of Generic Drugs to the Drug List.

3. Add other drugs or formulations included in the standard treatment guidelines that are not contained in the List of Generic Drugs to the Drug List.

> ✍ **Note:** Though drugs can be added to the Drug List at any time, it is preferable that, before starting Step 4, the CES Team has reached agreement on the standard treatment guidelines for the target conditions.

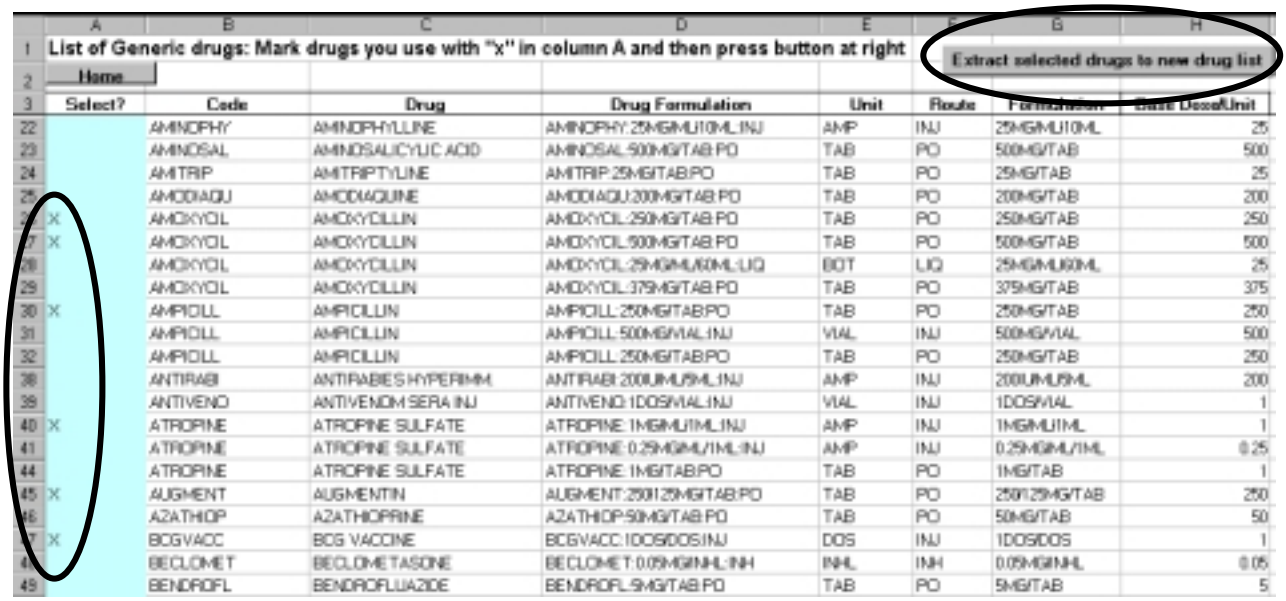
Select Drugs from the List of Generic Drugs

1. Go to the **List of Generic Drugs** by clicking on the **Sheet tab** labeled “Generic Drugs” or click on the *Maintenance Functions* button on the Homepage named “Create new Drug list from Generic list.”

2. Compare the items in the List of Generic Drugs with items listed in the manually prepared Treatment Sheets. Mark those drugs that are mentioned in the Treatment Sheets with “x” in the “**Select?**” column (**Column A**) of the List of Generic Drugs (see Figure 13).

A number of drugs appear in the List of Generic Drugs more than once because of variations in dosage or form. Special attention should be given to selecting the correct drug dosage and form for those drugs with multiple options by reference to the abbreviated drug description in Column D and Route and Formulation detail shown in columns F and G. (Each drug is uniquely described by the text in Column D, which is comprised of a code for the drug name, its formulation, and its route—columns B, G, and F.)

Figure 13. List of Generic Drugs



	A	B	C	D	E	F	G	H
1	List of Generic drugs: Mark drugs you use with "x" in column A and then press button at right						Extract selected drugs to new drug list	
2	Home							
3	Select?	Code	Drug	Drug Formulation	Unit	Route	Formulation	Unit Dose/Unit
22		AMINOPHY	AMINOPHYLLINE	AMINOPHY:25MG/ML/10ML:INJ	AMP	INJ	25MG/ML/10ML	25
23		AMINOSAL	AMINOSALICYLIC ACID	AMINOSAL:500MG/TAB:PO	TAB	PO	500MG/TAB	500
24		AMITRIP	AMITRIPTYLINE	AMITRIP:25MG/TAB:PO	TAB	PO	25MG/TAB	25
25		AMODIAQU	AMODIAQUINE	AMODIAQU:200MG/TAB:PO	TAB	PO	200MG/TAB	200
26	X	AMOXYCIL	AMOXYCILLIN	AMOXYCIL:250MG/TAB:PO	TAB	PO	250MG/TAB	250
27	X	AMOXYCIL	AMOXYCILLIN	AMOXYCIL:500MG/TAB:PO	TAB	PO	500MG/TAB	500
28		AMOXYCIL	AMOXYCILLIN	AMOXYCIL:25MG/ML/60ML:LIQ	BOT	LIQ	25MG/ML/60ML	25
29		AMOXYCIL	AMOXYCILLIN	AMOXYCIL:375MG/TAB:PO	TAB	PO	375MG/TAB	375
30	X	AMPICLL	AMPICILLIN	AMPICLL:250MG/TAB:PO	TAB	PO	250MG/TAB	250
31		AMPICLL	AMPICILLIN	AMPICLL:500MG/VIAL:INJ	VIAL	INJ	500MG/VIAL	500
32		AMPICLL	AMPICILLIN	AMPICLL:250MG/TAB:PO	TAB	PO	250MG/TAB	250
38		ANTIRABI	ANTIRABIES HYPERIMM	ANTIRABI:200IUMU/5ML:INJ	AMP	INJ	200IUMU/5ML	200
39		ANTIVENO	ANTIVENOM SERA INJ	ANTIVENO:1DOS/VIAL:INJ	VIAL	INJ	1DOS/VIAL	1
40	X	ATROPINE	ATROPINE SULFATE	ATROPINE:1MG/MU/1ML:INJ	AMP	INJ	1MG/MU/1ML	1
41		ATROPINE	ATROPINE SULFATE	ATROPINE:0.25MG/ML/1ML:INJ	AMP	INJ	0.25MG/ML/1ML	0.25
44		ATROPINE	ATROPINE SULFATE	ATROPINE:1MG/TAB:PO	TAB	PO	1MG/TAB	1
45	X	AUGMENT	AUGMENTIN	AUGMENT:250/125MG/TAB:PO	TAB	PO	250/125MG/TAB	250
46		AZATHIOP	AZATHIOPRINE	AZATHIOP:50MG/TAB:PO	TAB	PO	50MG/TAB	50
47	X	BCGVACC	BCG VACCINE	BCGVACC:1DOS/DOS:INJ	DOS	INJ	1DOS/DOS	1
48		BECLOMET	BECLOMETASONE	BECLOMET:0.05MG/INHL:INH	INHL	INH	0.05MG/INHL	0.05
49		BENDROFL	BENDROFLUAZIDE	BENDROFL:5MG/TAB:PO	TAB	PO	5MG/TAB	5

Transfer the Information from the List of Generic Drugs to the Drug List

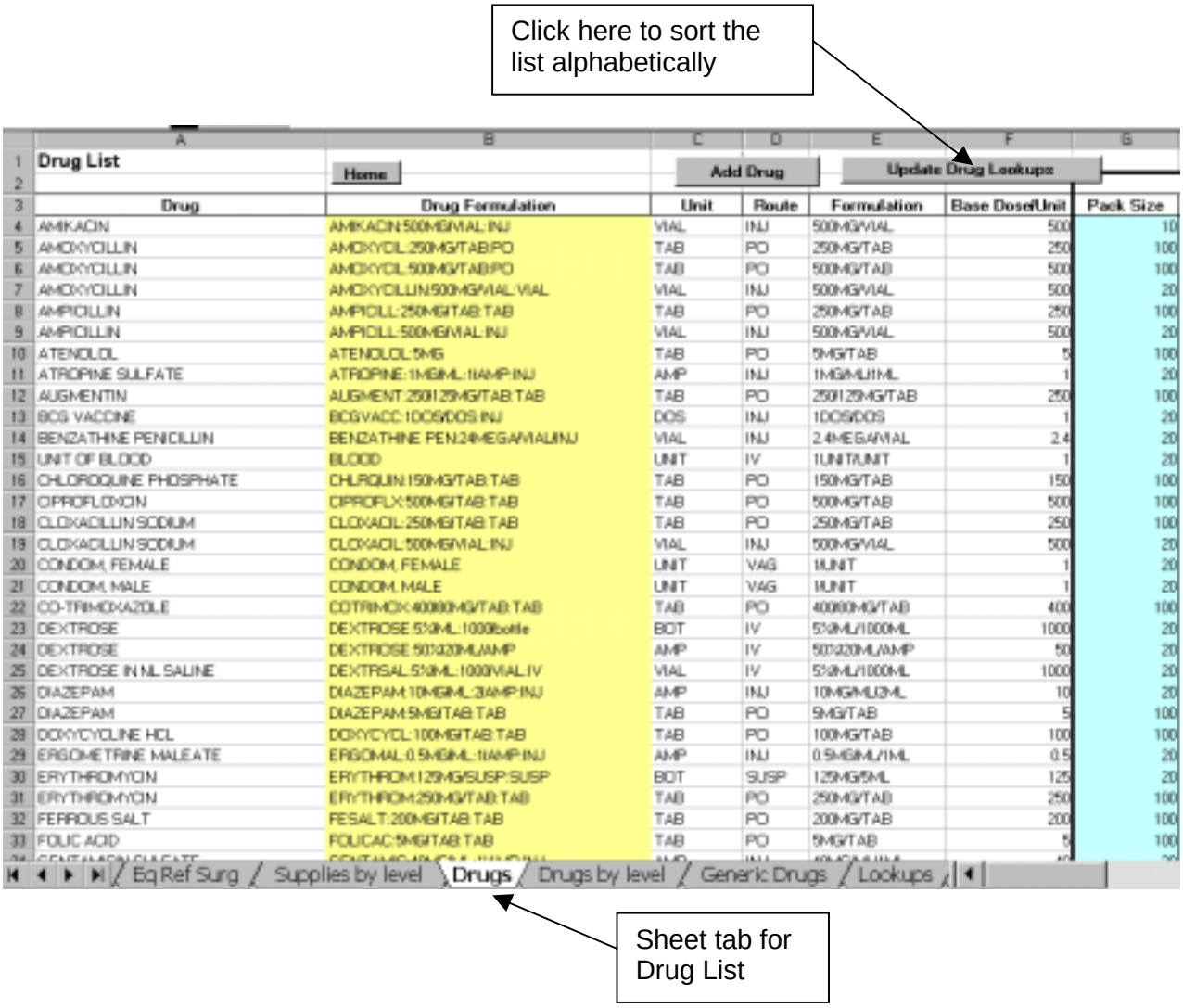
1. Once all the required drugs have been selected, click on the "**Extract selected drugs to new drug list**" button at the top of the List of Generic Drugs page (Figure 13). This will transfer the information related to the selected drugs (amoxycillin in 250mg and 500mg tablets, ampicillin, atropine sulphate, augmentin, BCG vaccine–from Figure 13) to the Drug List sheet.

2. Clicking on the "Extract selected drugs to new drug list" transfers the data for those drugs to the Drug List Sheet and displays the Drug List on screen (see Figure 14). Check if columns A–E of the Drug List have the information for the drugs selected from the List of Generic Drugs.

3. Sort the Drug List alphabetically by clicking the "**Update Drug Lookups"** button at the top of the page.

> ✍ **Note:** In order to keep the Lookup table functional, click the "Update Drug Lookups" button whenever an additional drug or an amendment is made to the Drug List.

Figure 14. Drug List



Add New Drugs to the Drug List

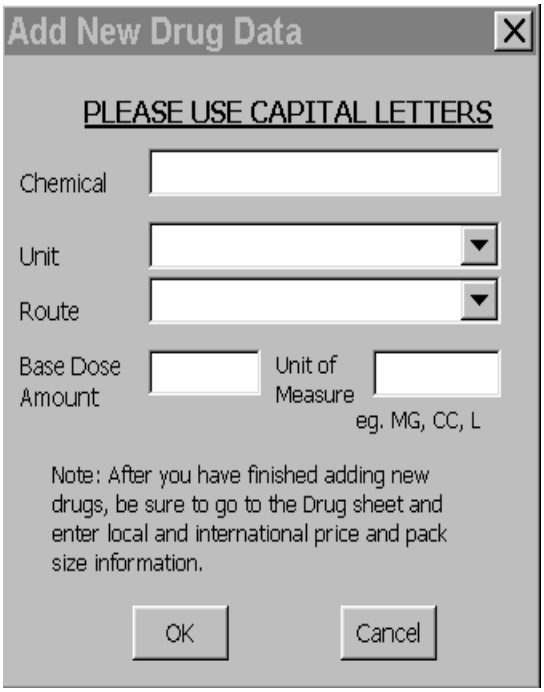
Once a working Drug List is developed from the List of Generic Drugs, changes and additions will have to be entered into the Drug List directly**. The List of Generic Drugs can not be used to add drugs to the Drug List**.

One of the likely changes will be the addition of new drugs or different formulations of drugs that are not already included in the list. To add new drugs or formulations to the Drug List, follow the steps below:

1. At the Homepage, click on the "Add drugs to list" button in the *Maintenance Functions* (Figure 11). Or in the Drug List sheet, click the "Add Drug" button.

2. This will launch a data entry window (Figure 15) allowing the user to enter information on the new drug or alternative drug formulation.

Figure 15. Data Entry Window for Adding Drugs



3. Complete the form by entering information. It is necessary to input information into all fields in the "Add New Drug Data" window. Both the "Unit" and "Route" fields offer drop-down menus from which to select the appropriate information.

4. Click on the "**OK**" button. The data on the new drugs are added to the Drug List. Update the lookups by clicking on the button at the top of the Drug List sheet.

5. The updated Drug List is then automatically made available for the drop-down menu in the Treatment Sheets.

6. If an error is discovered in the information for a new drug, or the code or formulation has not been generated by use of the entry window exactly as is preferred, the data may be amended in the Drug List (in columns A through F).

Step 5: Set Up the Supply List

As with the Drug List in Step 4, the **Supply List** (Figure 16) needs to be developed using information obtained from the manually completed Treatment Cost Sheets. The CES Model does not, however, contain a generic list of medical supplies. There are no accepted generic names or terminologies for medical supplies that can be understood universally as can the chemical names of drugs. Terms for medical supply items and how they are supplied vary significantly across countries. The Supply List will contain those consumable medical requirements essential to offer treatment or provide a service in line with the standard treatment guidelines.

> ✍ **Note:** It is advisable to have a person such as a store manager or supply officer, who is familiar with how the medical supplies are provided to the health facilities, carry out Step 5. Alternatively the user could collaborate with such a person.

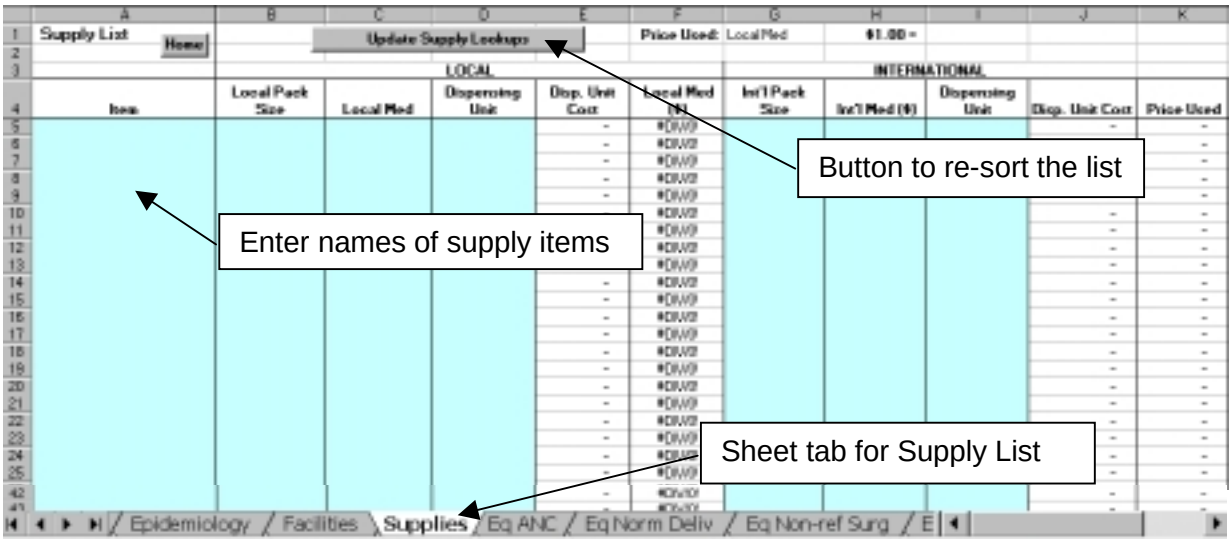
Follow the steps below to enter information on the Supply List.

1. Go to the Supply List by clicking on the **Sheet tab** "Supplies."

2. Enter the names of all the supply items in the "**Item**" column (Column A) from the manually completed Treatment Cost Sheets. Any additional information that is essential to identify or differentiate the supply item, such as the type and size, has to be fully described as part of the supply item name.

3. Sort the list alphabetically by clicking the **"Update Supply Lookups**" button at the top of the sheet.

Figure 16. Supply List



4. Enter in the "**Local Pack Size**" column (Column B) the smallest quantity in which the supply items can be purchased from suppliers. This unit should correspond with the unit price to be entered in the "Local Med" (Column C). For example, if syringes are sold in boxes of 25, the Local Pack Size is 25 and the cost entered in Column C is that for one box of 25 syringes. If items can be purchased individually, the Local Pack Size is 1 each. For items bought by weight or volume, such as cled agar (500g) and field stain powder (25g), it is still essential that the Local Pack Size (for example a bottle of 500g) correspond with the cost of this weight.

5. Enter the "**Dispensing Unit**," which refers to the proportion of the Pack Size that is required for the average administration of the treatment. For example, one 2cc syringe is needed to inject one dose of an antibiotic and if syringes are purchased in boxes of 25, then the Dispensing Unit is 1/25 or 0.04. This parameter is used by the spreadsheet to calculate the Dispensing Unit Cost, which is automatically displayed in Column E.

6. Repeat these steps in columns G and I for the International Pack Size and International Dispensing Unit.

> **Note:** For the drop-down menu to work properly, the source list (the Supply List in this case) has to be sorted alphabetically. Click "**Update Supply Lookups**" after entering data on additional items or amending existing information.

Figure 17 illustrates the Supply List with some data entered.

Figure 17. Supply List with Sample Data

	A	B	C	D	E	F	G	H	I
1	Supply List		Update Supply Lookups			Price Used:	Local Med	$1.00 =	1
2	Home								
3		LOCAL					INTERNATIONAL		
4	Item	Local Pack Size	Local Med	Dispensing Unit	Disp. Unit Cost	Local Med ($)	Int'l Pack Size	Int'l Med ($)	Dispensing Unit
14	cotton wool	ball		0.1	-	-	1 roll		0.1
15	elastoplast, roll	roll of 3"		0.01	-	-	1 roll		0.01
16	endotracheal tube sz 7.5	1 each		1	-	-	1 each		1
17	glass slide	1 each		1	-	-	1 each		1
18	glass tube, blood, red top	1 each		1	-	-	1 each		1
19	glass tube, capillary	1 each		1	-	-	100 tubes		1
20	gloves, non-sterile	1 pair		1	-	-	1 pair		1
21	gloves, sterile	1 pair		1	-	-	1 pair		1
22	hypochloride	5 liter		0.2	-	-	1 litre		0.2
23	IV set	1 each		1	-	-	1		1
24	KY jelly, tube	tube of 4.2 g		0.05	-	-	1 tube		0.05
25	lancet	1 each		1	-	-	1		1
26	Machintosh sheeting	1 each		1	-	-	1		1
27	measuring jug	1 each		1	-	-	1 each		1
34	scalpel blade sz 23	1 each		1	-	-	1 each		1
35	spirit, methylated, 250ml	5000ml		0.004	-	-	5000ml		0.004
36	suction catheter sz 10	1 each		1	-	-	1		1
37	sutures, chromic catgut sz	1 each		1	-	-	1 each		1
38	sutures, chromic or plain	1 each		1	-	-	1 each		1
39	sutures, silk 2/0	1 each		1	-	-	1 each		1
40	swabs, abdominal, large	roll of 36" x 10 yards		0.03	-	-	roll of 36" x 10 yards		0.03
42	syringe and needle, 10mm	box of 20		0.05	-	-	pack of 100		0.01
43	syringe and needle, 1cc	box of 20		0.05	-	-	box of 100		0.01
44	syringe and needle, 2cc	box of 20		0.05	-	-	box of 100		0.01
45	syringe and needle, 5cc	box of 20		0.05	-	-	box of 100		0.01
46	syringe, 20cc	1 each		1	-	-	box of 100		0.01
47	urine dipsticks	bottle of 100		0.01	-	-	bottle of 100		0.01

Note: It is recommended that the Drugs and Supplies Lists be printed out (Homepage *Select Sheets to Print*) and double-checked prior to entering data into the Treatment Sheets (Step 8).

Step 6: Set Up the Medical Equipment Lists

Develop Essential Medical Equipment Packages

In this Step, the CES Team develops essential medical equipment packages. The medical equipment packages contain items that are re-usable (following appropriate sterilization procedures), such as instruments and diagnostic, mechanical, or electric tools that provide multiple services. The CES Model requires that the team members identify the names and the quantity of equipment items in up to four categories, according to the type of services and particular locations within the health facilities where these services are typically provided. The default categories of equipment incorporated into the Model are—

1. Antenatal care (ANC) equipment
2. Normal delivery equipment
3. Non-referred surgical equipment
4. Referred surgical equipment

The Model assumes that most of the reproductive health services are provided at one of these locations in the facilities.

- **ANC equipment** is meant to be included in a facility at the lowest level of care (such as a dispensary in some countries) or in a section of an outpatient wing in larger facilities, where antenatal and other basic maternal and child health (MCH) services are provided to women and their babies.

- **Normal delivery equipment** is meant to be included in areas of health facilities at a higher level of care, such as a health center and hospital that can manage normal deliveries but lack the capacity to handle complications.

- **Non-referred surgical equipment** is equipment related to relatively simple surgical procedures or conditions, such as manual vacuum aspiration (MVA) and repair of laceration.

- **Referred surgical equipment** is in most cases in the operating room at the hospital level where Cesarean section and other surgical procedures are conducted to manage complications related to deliveries.

Determining which equipment is essential for the selected reproductive health conditions can be complicated. Even when standard treatment guidelines are available, more often than not they will not include recommendations for the equipment needed. In such cases the CES Team will need to reach a consensus on which essential equipment should be included in an ANC, normal delivery, non-referred surgical (e.g., obstructed labor), or referred surgical equipment package. It may be helpful for the team to visit a facility and observe what equipment is currently being used—for example, for a Cesarean section.

In the CES Model, **essential** equipment means equipment without which a safe procedure is not possible. An equipment package should include all the equipment necessary to treat a woman for the conditions that could be classified under the above-mentioned categories. The list of essential equipment for the CES Model should not be unnecessarily extensive. High-tech or state-of-the-art equipment should not be included if a simpler acceptable alternative is available.

Electronically Prepare the Medical Equipment Sheets

The CES template spreadsheet is set up to enable four different medical equipment packages to be identified and defined. Their default titles are in the Homepage, *Equipment* "ANC equipment list," "Normal delivery equipment list," "Equipment for non-referred surgery," and "Equipment for referred surgery." These correspond to Sheet tabs "Eq ANC," "Eq Norm Deliv," "Eq Non-ref Surg," and "Eq Ref Surg," respectively.

The CES team may use alternative names or define fewer than four equipment packages. Alternative equipment package names should be input into cell A1 of each equipment package sheet. These automatically appear in the Cost Estimate Summary sheet and reports, but not in the Homepage. The default title in the Homepage should be overwritten and abbreviated as necessary to display in the cell. However the four equipment Sheet tabs themselves may not be amended because macros and embedded formulas reference these Sheet tab names. From the Homepage (see Figure 18), click on the desired button to access each equipment sheet. Figure 19 illustrates the equipment sheet for ANC equipment.

Figure 18. Jumping to the Equipment Lists (from the Homepage)

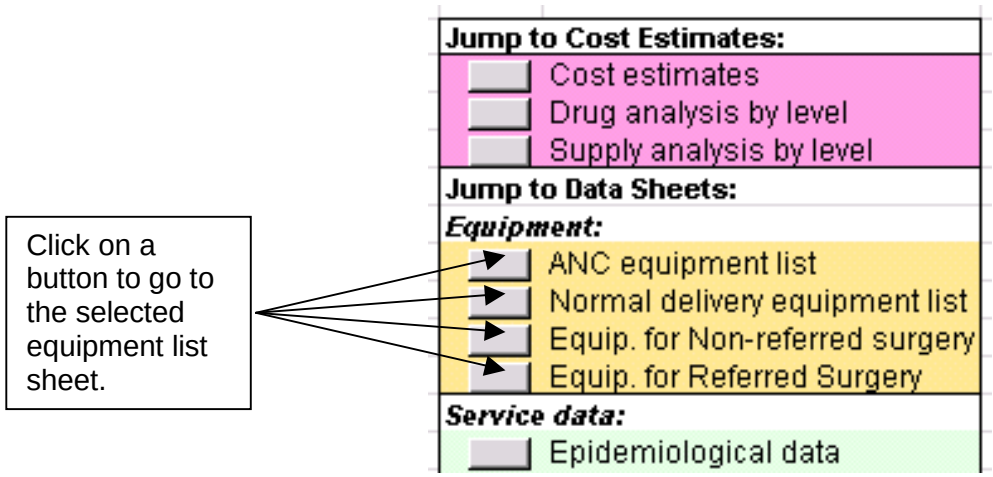


Figure 19. Sample List for ANC Equipment Package

	A	B	C	D	E	F	G	H
1	Basic Antenatal Care Equipment		Home	US $1.00 =	1			
2								
3				Unit Prices		Reference or		
4	Equipment Type	# Units	Local Med	Local Med ($)	Int'l Med ($)	Catalog #	Calc. Price	Total Price
5	Scale, adult	2		-			-	-
6	Stethoscope	2		-			-	-
7	Fetalscope	2		-			-	-
8	Syphmomanometer	2		-			-	-
9	Tape measure	1		-			-	-
10	Thermometer	2		-			-	-
11	Gestational wheel	1		-			-	-
12	Refridgerator	1		-			-	-
13	Carry box with ice	4		-			-	-
14	Couch	1		-			-	-
15	Ultrasound machine	1		-			-	-
16	Screen	1		-			-	-
17				-			-	-
18				-			-	-
19				-			-	-
20				-			-	-
21							Total Cost	-

Components of the Medical Equipment Lists

The basic structure of the four equipment lists is the same. The following briefly describes key information the user will need to enter data. (See also Figure 19**,** an example of an ANC equipment list.) As with all other parts of the CES Model, areas where data entry is allowed are shaded in blue on the screen. Unshaded cells have embedded formulas that carry out conversion and other calculations necessary to produce the total cost for each equipment package.

Equipment Type (Column A) — This column identifies basic medical equipment items necessary for any facility offering the selected reproductive health services. If other information, such as type and size of equipment, is important, make sure the descriptions of these items are specific.

 # Units (Column B) — This column contains the number of each piece of equipment needed per package. For each equipment item selected, decide how many units of each item should be included in one package.

Local Med and **Int'l Med ($) (columns C and E)** — These columns list the unit cost of equipment if purchased locally or on the international market. As described in more detail in Step 7, the user enters the unit prices of selected items in the respective columns. The CES Model calculates the total cost per equipment package using either local or international prices. More detailed information is given in Step 7.

Other columns — **Column D** automatically displays the Local Median price converted to US$ (using the exchange rate entered in the Homepage), following entry of the Local Med. price. **Column F** is available to note the reference or catalog # if this is used as a reference source for identifying medical equipment items. **Column G** displays the price being used in the calculation of the Total Price (**Column H**), which depends upon the option selected in the Homepage.

Step 7: Collect and Enter the Commodity Costs

Collect Cost Information

By now, the CES Team has lists of drugs, medical supplies, and equipment necessary to implement treatment options that have been selected for the reproductive health conditions of interest. In this Step, the team is going to collect another important piece of information for the CES Model, namely the **costs** of these items on the local market.

Where to look for the cost information of reproductive health commodities depends on the procurement system of the health care system as well as on the scope of the analysis. Sources of local price data include public or private nonprofit procurement agencies, local major commercial suppliers, and health facilities that purchase equipment locally. Typically, cost information at the central level can be found from one of the following two sources:

- Prices most recently paid by the government's procurement system (e.g., central medical store or government procurement agency)
- A mini-survey of the local major suppliers

In addition, the CES Team may find it useful to compare local commodity prices with those on the international market. The Drug List, Supplies List, and Equipment Sheets all allow the input

of **international price** information (the column in each sheet is headed "**Int'l Med**"). Sources of such information include price lists from major international nonprofit suppliers, such as the United Nations Children's Fund (UNICEF) and the International Dispensary Association (IDA), and references such as the *International Drug Price Indicator Guide* published by Management Sciences for Health.

> **Note:** Due to variation in unit prices quoted by different suppliers, the CES Team should use **median prices** for the analysis. The median value is the middle value of a set of numbers when they are sorted in order of magnitude. Therefore, half of the numbers have values that are greater than the median and half have values that are less than the median. If there is an odd number of figures in the series, the median is the middle value. For a series with an even number of figures, the median is the average of the two middle values. The use of median price reduces the influences of extreme data (i.e., too expensive or too cheap) on the cost estimation.
>
> **Example**:
> In both of the following cases, the median value is 30:
> - If data are 10, 20, 30, 40, and 60
> - If data are 10, 20, 25, 35, 40, and 60

Enter Cost Information in the Model

Homepage

Go to the *Enter Values for Constants* section of the Homepage (Figure 8) and type

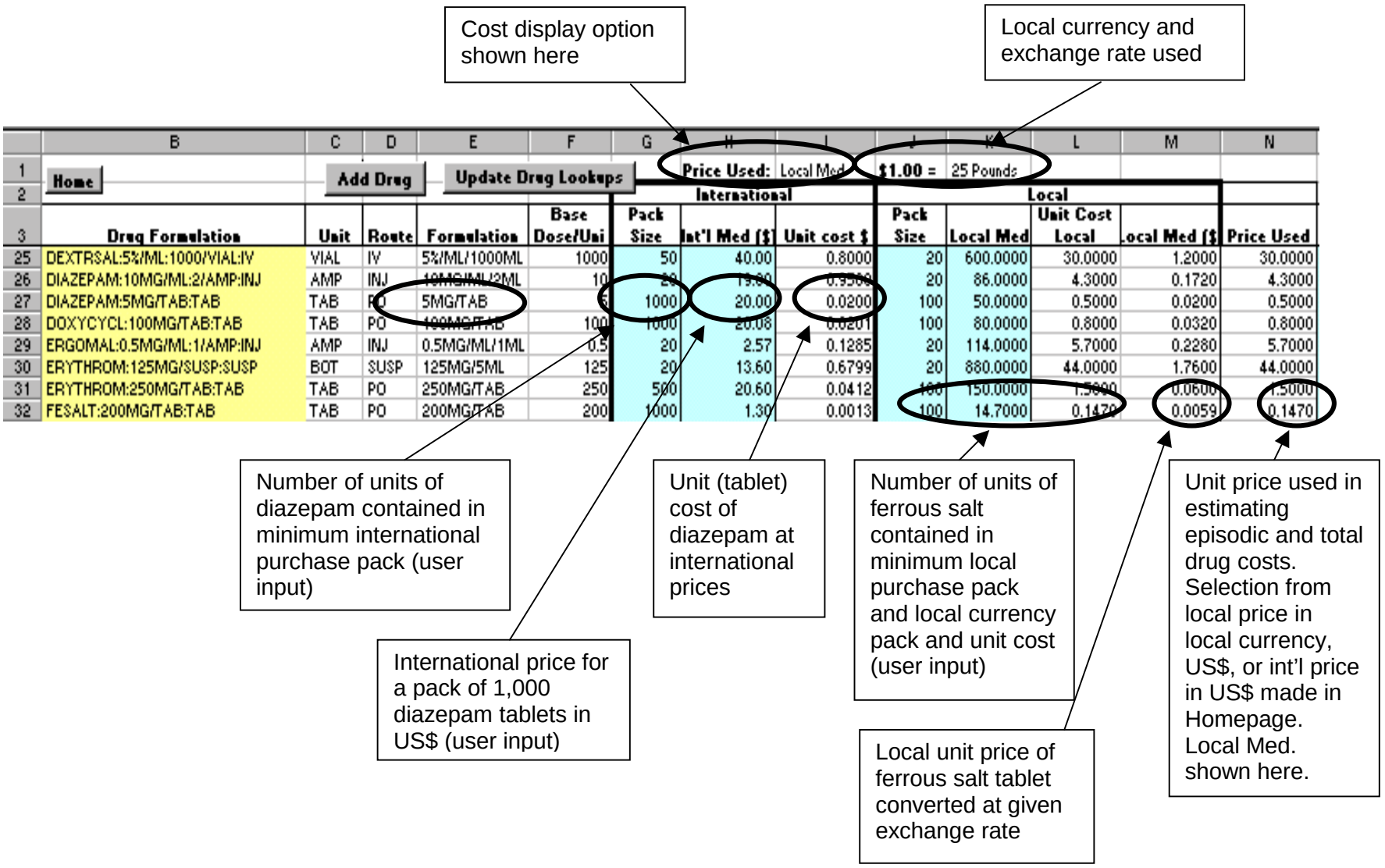
- Name of local currency in Cell J4 and
- Exchange rate per US$ in Cell J5

The CES Model uses the exchange rate entered in Cell J5 to convert commodity costs from local currency to U.S. dollars.

The exchange rate and the name of the local currency are combined by the embedded formula and displayed in relevant parts of the Model including the Drug List and Supply List (see Figure 20). Users can change the exchange rate as it fluctuates.

> **Note:** Make change to the exchange rate only in the Homepage, not in the individual worksheets, so that the new rate is appropriately displayed throughout the Model.

Figure 20. Section of the Drug List with Sample Data



Drugs

In the Drug List (see Figure 20), enter in the blue-shaded areas—

- Local median unit prices, expressed in the local currency, in the "**Local Med**" column (Column K) and

- Corresponding international prices in the "**Int'l Med ($)**" column (Column H)

The treatment sheets determine the costs of drugs for the average case of treatment of a condition with reference to the cost of a unit of the drug. A unit may be thought of as the smallest physical "container" of the chemical concerned. Thus ampicillin may be available in a 250mg and a 500mg tablet and a 100ml vial (which itself contains 25mg/ml). The unit in the first two examples is a tablet and the unit cost is determined by dividing the pack price by the number of tablets in a pack. (Note that if the pack contains 20 bottles of 100 tablets each, then the pack price must be divided by 20 x 100 = 2,000 to determine the unit cost.)

It is important that commodity prices in the CES Model are all **Unit Prices** that correspond with the unit listed in the "**Formulation**" of each item. For example, if the price quoted for a bottle of 1,000 500mg paracetamol tablets is $3, the unit price is $3 divided by 1,000, or $0.003 for one 500 mg tablet. If the price obtained for 25mg/ml ampicillin in a 100ml vial is $4.45 for 20 vials, then the unit cost is $4.45 divided by 20, and equals $0.2224.

Required Data for Cost Comparisons

The CES Model can compare the costs of reproductive health commodities when purchased in the international market and in the local market. The episodic and total costs per treatment can be alternatively displayed in US$ and in the local currency converted to US$. However to make such comparisons valid and accurate, it is essential that both the international median and the local median price be entered for each and every drug (or supply item). In the absence of one of the prices for a single item, it is advisable to enter the same price as Local Med. and as Int'l Med. to minimize the distortion in the comparison that would result from not entering the missing data.

Medical Supplies

The Treatment Cost Sheets calculate the costs of medical supplies for the average case of treatment of a condition with reference to the cost of a **dispensing unit** of the item (see Figure 21).

The Supply List automatically calculates the cost of a dispensing unit from data provided on the pack price, quantity of the item per pack, and the dispensing unit. **Dispensing Unit** in the CES Model is the average amount of an item that is dispensed when services are provided to an individual patient expressed as a proportion of the Pack Size, local or international. If a pack contains exactly the quantity required for one treatment then the dispensing unit is 1.

For example, if grouping serum type A is purchased locally in 10ml bottles by a hospital and, on average, 50 tests can be done with one bottle, the local pack size and dispensing unit are as follows:

Local pack size: 1 10ml bottle

Dispensing unit: 0.02

If syringes are purchased in boxes of 100, and one syringe is used per injection, then the dispensing unit is 0.01.

Enter the following cost data in the Supplies Sheet (see Figure 21):

- Local pack size for each item in Column B (e.g., 5 liters of hypochloride, box of 25 lancets)
- Local median pack price of each supply item in local currency in the "**Local Med**" column (Column C)
- The dispensing unit for each item (Column D)

Then repeat this for the corresponding international prices in the "Int'l Pack Size" (Column G—which may differ from locally supplied items), the pack price in "Int'l Med ($)" (Column H), and the Int'l Dispensing Unit (Column I).

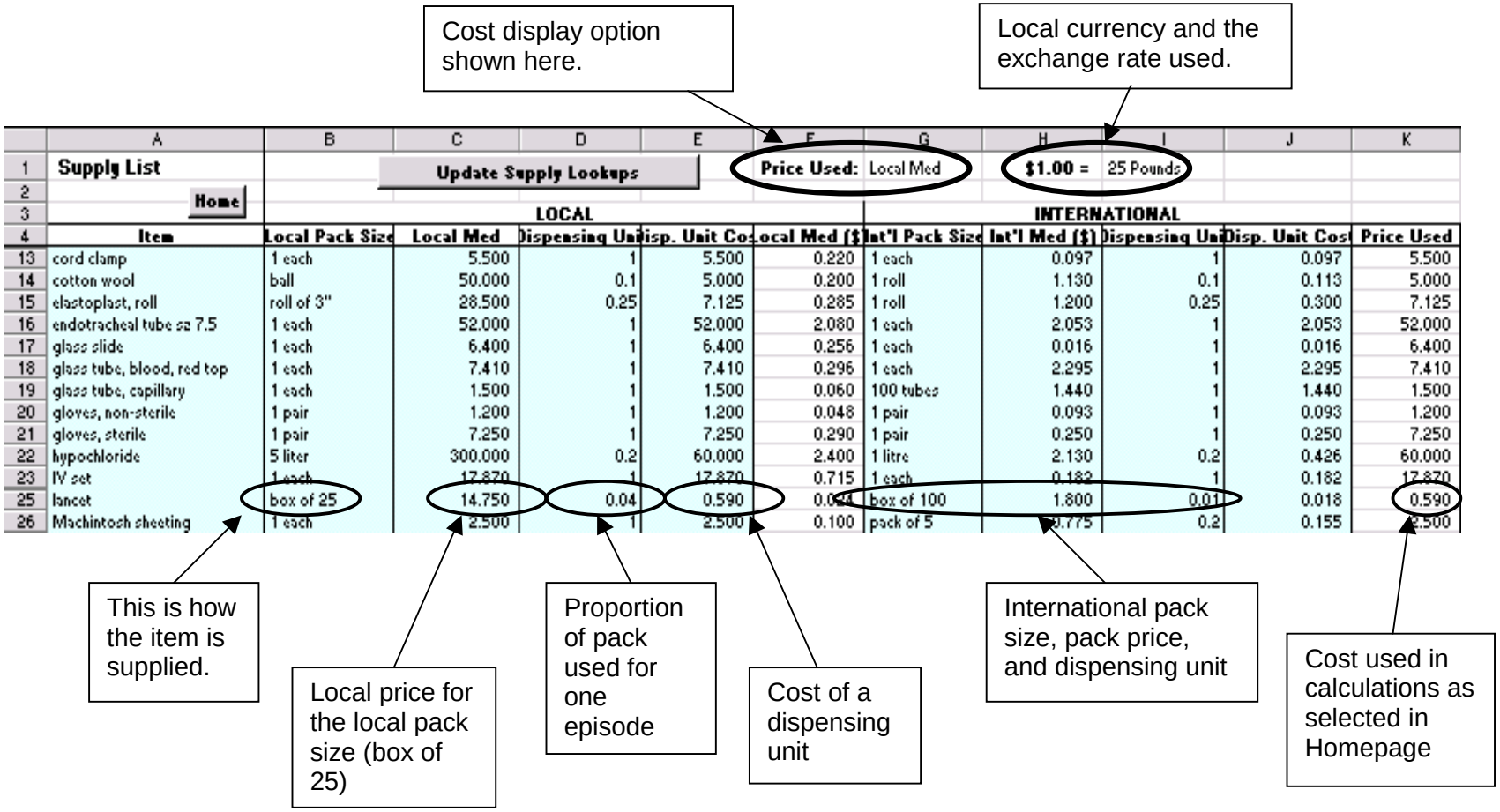
In the Treatment Sheets, the embedded formula will calculate the supply costs per episode as follows (see also the definitions of terms in Step 1 of this chapter):

Quantity/Administration X # of Administration X Dispensing Unit X Unit Price.

Make sure that the Unit Price and Local Unit correspond and that the Dispensing Unit is expressed appropriately as a proportion of the Local and International Pack Sizes.

As described in the previous section (Drugs), the embedded formula converts local median price, expressed in local currency, into local median price in U.S. dollars, based on the exchange rate entered in the Homepage. Change the exchange rate **only** in the **Homepage**, not in the individual worksheets.

Figure 21. Section of Supply List with Sample Data



Medical Equipment

Local median unit prices expressed in local currency should be entered in the "**Local Med**" columns in the four Medical Equipment Cost Estimate sheets:

- **Column C** in the ANC Equipment List (Figure 19)
- **Column I** in the Normal Delivery Equipment, Non-referred Surgical Equipment, and Referred Surgical Equipment lists

The embedded formula automatically converts local median prices to U.S. dollars using the exchange rate given in the Homepage. Again, to change the exchange rate, do so in the Homepage, not in the individual worksheets.

If corresponding (median) international price information is available, enter it in the following columns:

- **Column E** in the ANC Equipment List (Figure 19)
- **Column K** in the Normal Delivery Equipment, Non-referred Surgical Equipment, and Referred Surgical Equipment lists

Box 3.
Conducting a Sensitivity Analysis

The price range for medical commodities, especially medical equipment, tends to be wide, and the resulting estimates for equipment packages may be influenced by a few very expensive items. If there is concern with the large price difference for the same item between suppliers or manufacturers, it is useful to conduct a sensitivity analysis. Observe how the selection of lower or higher prices of particular items may or may not influence the total financial requirements for medical equipment.

Stage 2—Entering Data in the Model

Step 8: Enter Data into the Treatment Sheets

With all the supporting lists complete, the CES Model is ready for the user to enter details into the Treatment Cost Sheets based on the manually prepared forms (see Step 1). Data is entered into the blue-shaded columns, A–K for Drugs and A–H and J for Supplies. The Model has links in columns C (Drug), D (Route), and K (Formulation) to the Drug List and Lookups and Column C (Supply Item) to the Supply List that facilitate data entry and help to minimize input error.

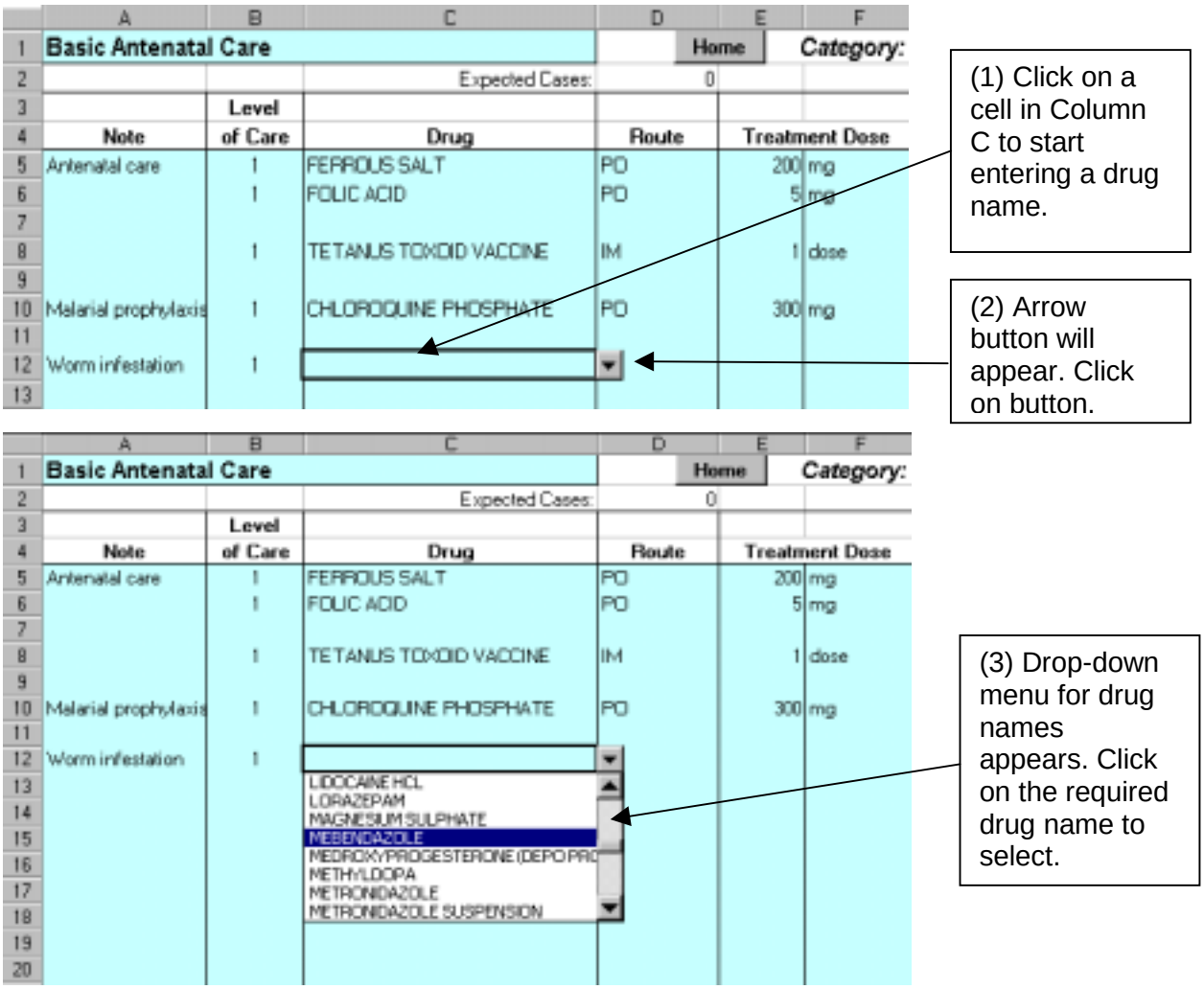
General

Enter any Notes in Column A and the Level of Care at which the drug or supplies are used in Column B. For general descriptions of each data item, refer to Step 1 of this chapter.

Drug Section

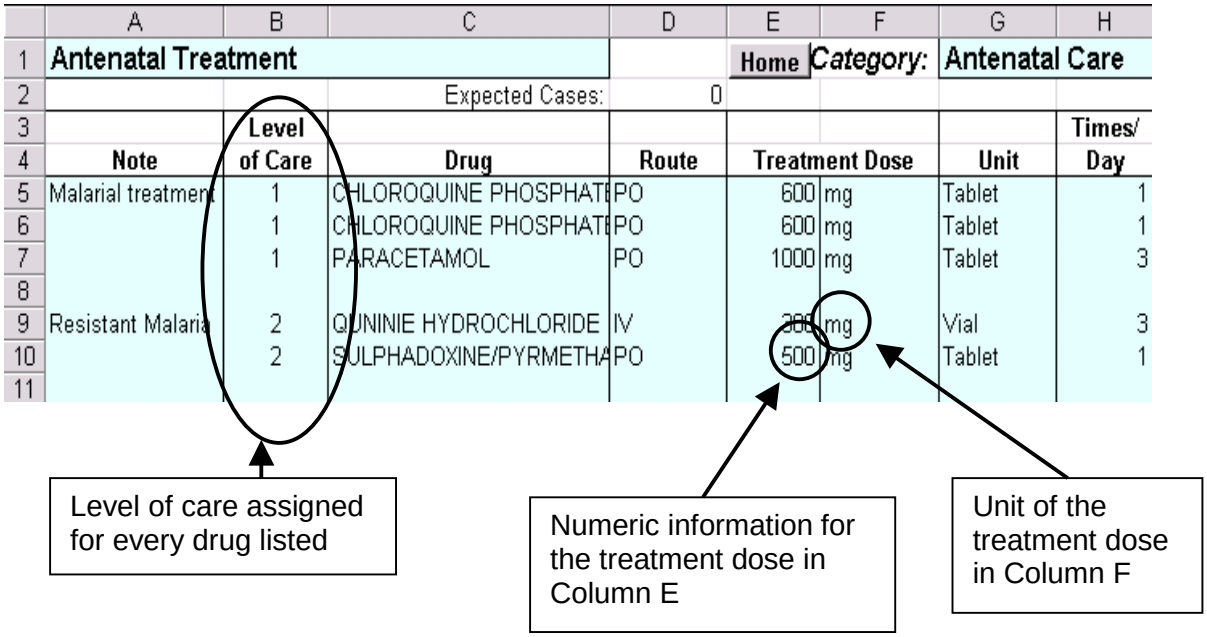
1. For Drug and Route information, click the cursor in **columns C** or **D,** respectively**.** A **drop-down menu** will appear showing the acceptable range of selections. See Figure 22 for an example of drug name drop-down menu, which is similar to the Supply Item in Column C of the Supply Section.

Figure 22. Drug Name Drop-Down Menu with Sample Data



2. Level of Care (Column B) information must be entered for every drug (and supply item) in order for the spreadsheet to calculate the level of care analyses consistently. Enter the lowest level of care where the selected treatment or test is provided (see Figure 23).

Figure 23. Section of Treatment Sheet with Sample Data on Level of Care

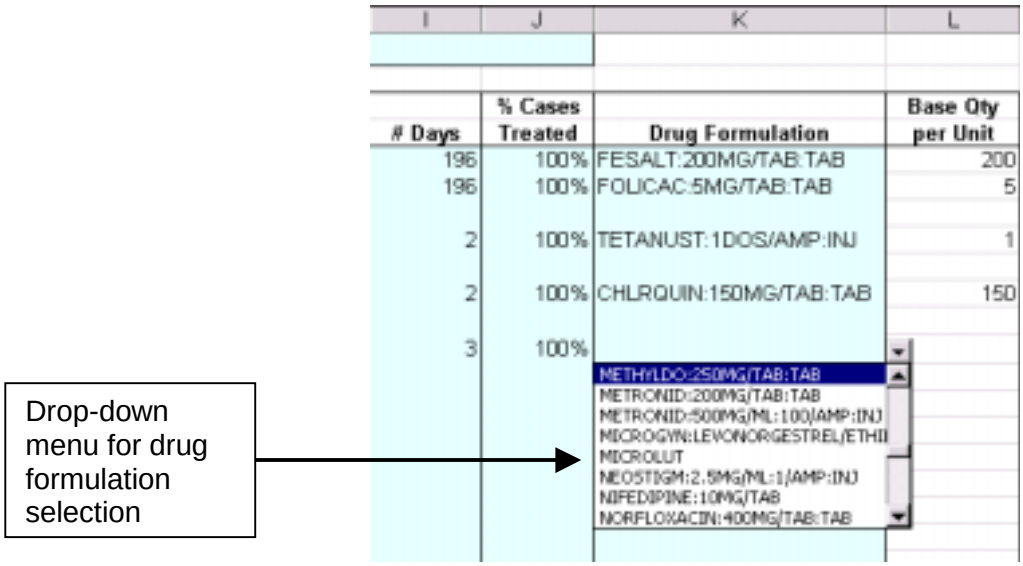


3. Make sure to enter the number part of the Treatment Dose information in Column E separate from the unit in Column F. If left together (e.g., 500mg) in one cell, the spreadsheet program recognizes it as text rather than a number, and the formula will not function.

4. See general notes about Unit, Times/Day, #Days, and % Cases Treated (columns G,H, I, and J) at the beginning of this chapter.

5. Enter the appropriate "**Formulation**" in **Column K** using the drop-down menu for each drug (Figure 24). The selection here determines which unit price will be used in the calculation of episodic drug cost, and it therefore affects the total cost estimates. Be sure to choose the correct formulation for each drug item by checking the name and the drug dosage.

Figure 24. Drug Formulation Drop-Down Menu with Sample Data



Note: Selecting a Formulation in Column K automatically transfers data from the Drug List to columns L, N, and O of the Treatment Cost Sheet. If data are subsequently amended in the Drug List—for example, a pack price is changed—then reselect the formulation in Column K to ensure that the amended information is transferred to the Treatment Cost Sheet.

Medical Supply Section

1. All medical supplies that are used for one procedure for a treatment option should be listed as a group in Note (Column A). For example, syphilis screening requires syringes, needles, venereal disease (VD) kit, and glass tube (see Box 4). Descriptions of tests recommended should be entered here. A second example is illustrated in Figure 25.

2. Level of Care (Column B) is the same as the Drug Section.

3. The Supply Item (Column C) is entered using the drop-down menu linked to the Supply List.

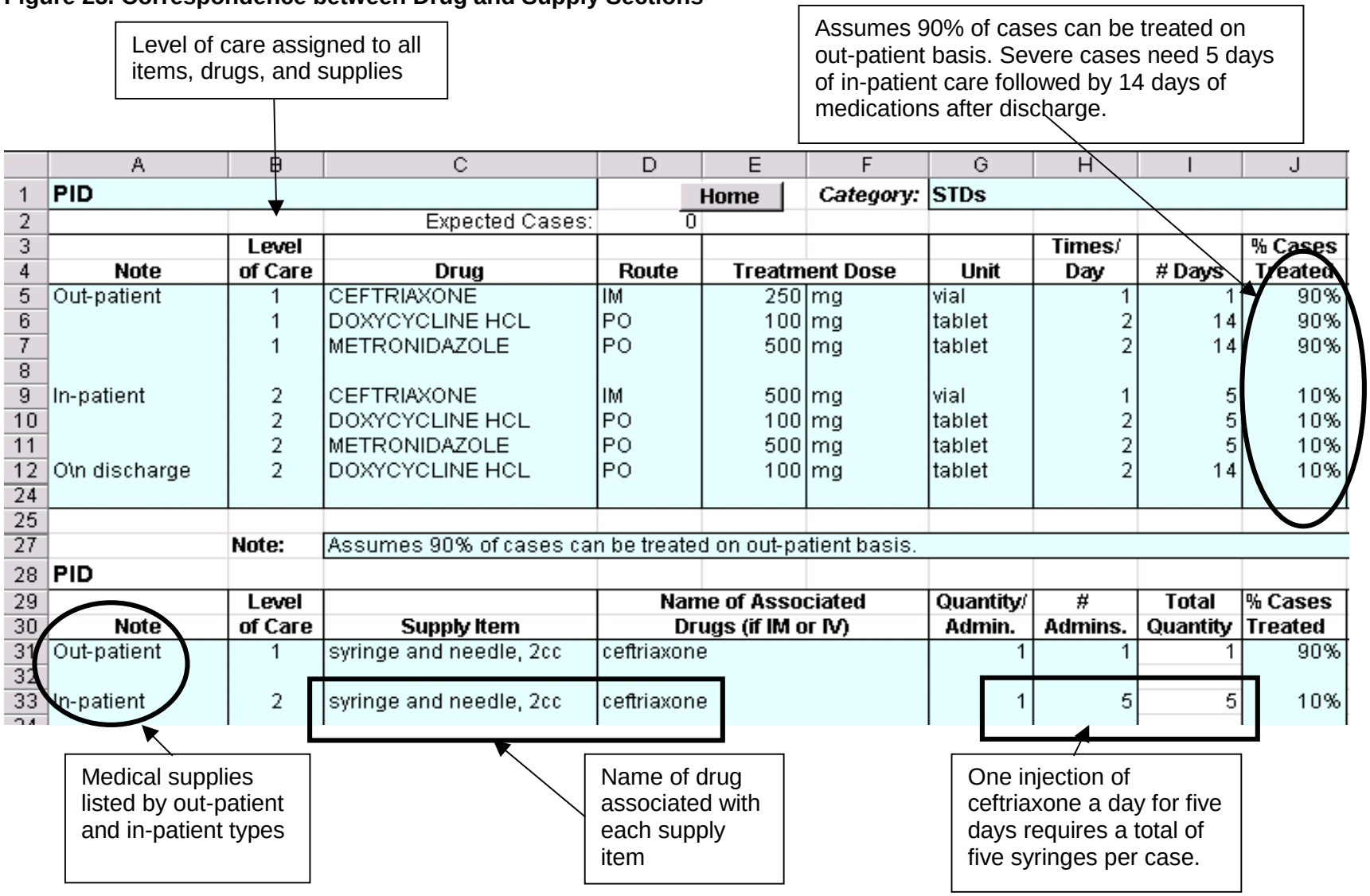
4. In the Name of Associated Drug(s) (columns D–F), list the names of injectable drugs on the same row for which the medical supplies are listed in Column C, as a reference for counting the number of items such as syringes and needles.

5. For Quantity/Admin., # Admins. (columns G–H), see general notes at the beginning of this chapter.

6. The Total Quantity (Column I) is automatically calculated from data in columns G and H.

7. The Percentage of Cases Treated (Column J) for each item should be the same as the figures for the corresponding drugs. For laboratory test supplies, the percentage should reflect estimated need or the policy for certain tests in accordance with the recommendations.

Figure 25. Correspondence between Drug and Supply Sections



	A	B	C	D	E	F	G	H	I	J
1	**PID**				Home		*Category:*	**STDs**		
2			Expected Cases:	0						
3		**Level**						**Times/**		**% Cases**
4	**Note**	**of Care**	**Drug**	**Route**	**Treatment Dose**		**Unit**	**Day**	**# Days**	**Treated**
5	Out-patient	1	CEFTRIAXONE	IM	250	mg	vial	1	1	90%
6		1	DOXYCYCLINE HCL	PO	100	mg	tablet	2	14	90%
7		1	METRONIDAZOLE	PO	500	mg	tablet	2	14	90%
8										
9	In-patient	2	CEFTRIAXONE	IM	500	mg	vial	1	5	10%
10		2	DOXYCYCLINE HCL	PO	100	mg	tablet	2	5	10%
11		2	METRONIDAZOLE	PO	500	mg	tablet	2	5	10%
12	O\n discharge	2	DOXYCYCLINE HCL	PO	100	mg	tablet	2	14	10%
24										
25										
27		**Note:**	Assumes 90% of cases can be treated on out-patient basis.							
28	**PID**									
29		**Level**		**Name of Associated**			**Quantity/**	**#**	**Total**	**% Cases**
30	**Note**	**of Care**	**Supply Item**	**Drugs (if IM or IV)**			**Admin.**	**Admins.**	**Quantity**	**Treated**
31	Out-patient	1	syringe and needle, 2cc	ceftriaxone			1	1	1	90%
32										
33	In-patient	2	syringe and needle, 2cc	ceftriaxone			1	5	5	10%

Box 4.
Organizing the Supply Section

For better organization of the information in the supply section of the Treatment Cost Sheets—

- List medical supplies grouped by the components of the treatment protocol (e.g., first and second line treatment, treatment for pregnant women, or tests) in the same order as listed in the drug section of the sheet. (See the Normative Cost Estimates in **Appendix B** as an example.)
- Fill in the names of the injectable drugs or IV fluids for the supply items used with them under the "**Name of Associated Drugs."** These details will help keep an accurate count of the necessary quantity of supply items, such as syringe and needle and IV set.

Automatic Data Display—Columns L–Q

By entering the data in the columns shaded in blue, the embedded formulas either transfer relevant information from the Drug and Supply Lists or calculate the data for the following columns in the Treatment Cost Sheet—

- **Drugs Section**
  Quantity per Unit (Column L)
  Units per Dose (Column M)
  Total Units (Column N)
  Median Unit Cost (Column O)
  Cost per Episode (Column P)
  Weighted Average Total Cost (Column Q)

- **Supplies Section**
  Total Quantity (Column I)
  Supply Pack Size (Column K)
  Dispensing Unit (Column L)
  Total Dispensed Units (Column M)
  Median Unit Cost (Column N)
  Cost per Episode (Column O)
  Weighted Average Total Cost (Column P)

Step 9: Estimate and Enter Caseload Data

To estimate the total commodity requirements for the population of interest, the CES Model needs caseload data, either estimated or actual, for the selected reproductive health conditions and services.

Scenario Assessment

Caseload data are essential in determining the total commodity needs. The **Epidemiology and Service Utilization Estimate Sheet** of the CES Model is designed to help users collect necessary information. Two sets of caseload data may be entered into this sheet (these have the default headings, Scenario A and Scenario B, which can be replaced as required—see Step 2). This feature allows the user, for example, to—

- Compare commodity needs and costs for reproductive health services using different estimates of caseload data
- Determine the costs for two selected geographical or administrative areas using the same spreadsheet file
- Calculate the costs for the country and the costs for public health facilities separately (This requires that the proportion of cases using public services be known.)

> **Note:** If the CES Model is used at a single facility (e.g., hospital) and reliable caseload figures are available, you do not need to enter multiple data sets as described below.

The example of Epidemiology and Service Utilization Estimate Sheet (see Figure 29) illustrates two data sets entered in the Model:

1. National Estimate
2. Region A

An alternative example would be to compare the current potential caseload in the community derived from population-based morbidity and epidemiology data with the current caseload in public facilities based on the actual caseload figures obtained from service records at public facilities. Total commodity needs calculated using the current potential caseload in the community would represent the maximum commodity requirements to provide essential care for the selected reproductive health conditions to the entire population of the community. For various reasons, not all of these cases in the community are currently receiving the care at health facilities.

In the absence of private sector services, total commodity needs based on the current caseload in public facilities represent what is necessary to provide essential reproductive health service to those who seek care at public facilities. The gap between the two estimates indicates additional commodity needs that are necessary to expand the current coverage of reproductive health service in the population.

Community-based estimates of the underlying epidemiological need for most reproductive health conditions (especially conditions such as pre-eclampsia and postpartum hemorrhage) are difficult to obtain except through a detailed epidemiological survey. Often, users have no choice but to make estimates based on the best information available.

If concerns exist about the accuracy of morbidity and service utilization data, this data sheet can be used to assess the commodity needs associated with, say, low and high estimates. The Model then provides provide commodity needs as a range between the high and low figures.

Set Up the Sheet

The first step in completing the Epidemiology and Service Utilization Estimate Sheet is to set up the sheet with the names and types of conditions and services selected for review. This is accomplished automatically by clicking the "Update Cost and Epidemiology Estimates sheet" button in the *Maintenance Functions* section of the Homepage (Figure 26). An embedded macro transfers the information entered in cells **A1** and **G1** of each Treatment Sheet to the Epidemiology and Service Utilization Estimate Sheet (and the Cost Estimate Summary). See Figure 27 for an example of the updated Epidemiology and Service Utilization Estimate Sheet.

✍ **Note**: Updating the Epidemiology and Service Utilization Estimate Sheet should be performed **only** after **all** basic information has been entered in **all** the Treatment Cost Sheets.

Figure 26. Update the Epidemiology and Service Utilization Estimate Sheet with the List of Conditions

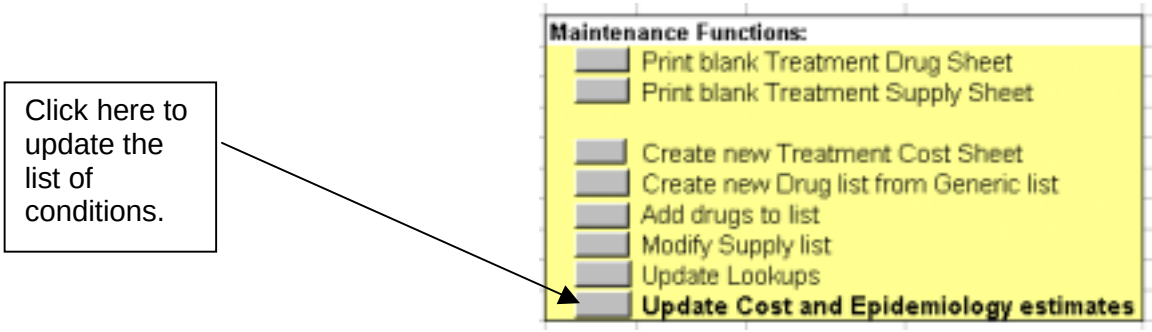
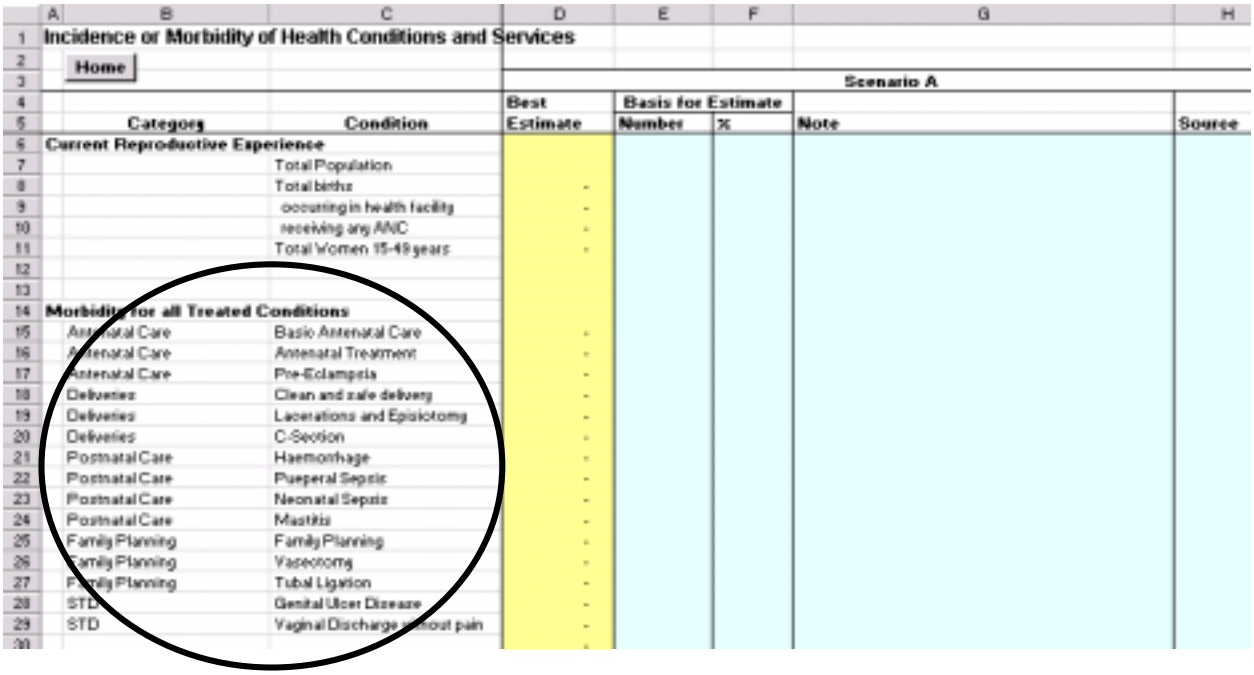


Figure 27. Epidemiology and Service Utilization Estimate Sheet Updated with the Names of Treatment Categories and Conditions



Enter the Data

The layout of the data entry range of the Epidemiology and Service Utilization Estimate Sheet (shaded in blue and yellow) is identical for the two scenarios (A and B). The user has two options for entering the caseload figures, either or both of which may be input (see Figure 28):

Option 1: If the actual or estimated caseload *number* is known for the reproductive health condition, enter that number in the "***Basis for Estimate***" under "Number" (**columns E** and **J**).

Option 2: If the actual or estimated caseload number is not known or available, but an estimate of the caseload as a proportion of known events can be made, then enter the percentage in the "***Basis for Estimate***" under "***%***" (**columns F** and **K**).

"Known events" are generally demographic or health statistics derived from reliable sources on the target populations, such as total population (of the target group), number of births, and number of women aged 15–49. Often the morbidity or incidence of a condition or service may be measured in relation to the target population. Several known events have been selected for use in the Model and appear in the top section of the Epidemiology and Service Utilization Estimate Sheet (see Figure 28). Alternative statistics for which better data are available may be included by using the blank rows 12 and 13 in this section. Knowledge of Excel is needed to ensure that these statistics will be accessed by the spreadsheet formula correctly. (See the next section, Incorporate Other Reference Points for Estimating Caseloads, for more details.)

A formula embedded in the Best Estimate column (Column D for Scenario A and Column I for Scenario B) determines which of the above options to use in calculating the caseload for each condition, as follows:

- If a caseload number is entered in column E or J, the Best Estimate column (Column D or I) will display that figure and use it in calculations.

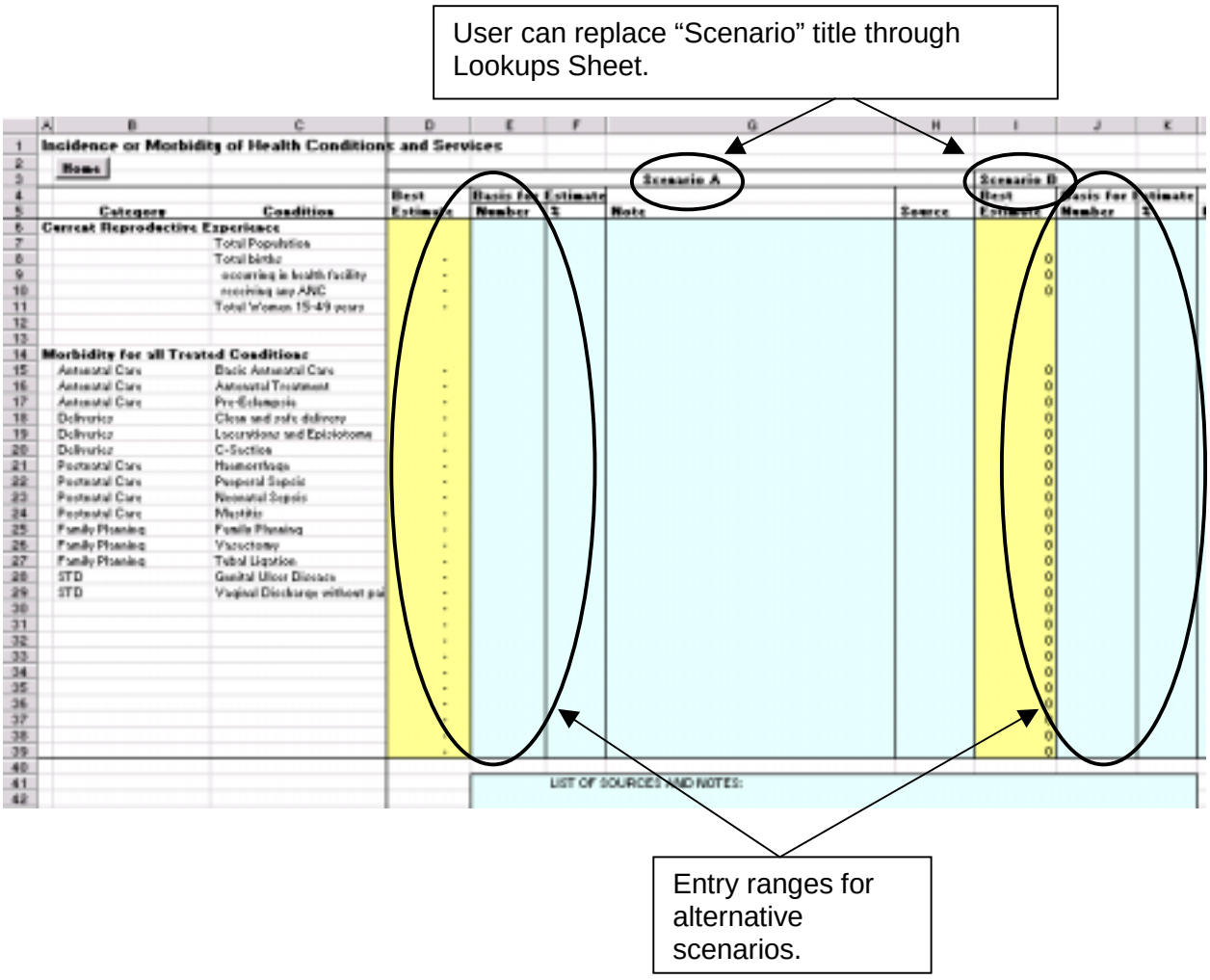
- If the caseload number is not available, but a percentage of one of the known events is known or estimated and entered in Column F or K, then the embedded formula in the Best Estimate column determines the caseload using the percentage given and the related known event (e.g., the total number of births).

- If the caseload is given both in number (in Column E or J) and in percentage (in Column F or K), the embedded formula in the Best Estimate column displays, and uses for calculations, the number.

The user can change the data in the Basis for Estimate at any time and update the Cost Estimates accordingly. Collecting the epidemiological data and service utilization data may not be easy in some situations. It is advisable to start building the Epidemiology and Service Utilization Estimate Sheet with available data and improve the estimates, as more accurate information becomes available.

Assumptions made in estimating the caseload should be recorded in the **List of Sources** and **Notes** section of the sheet for future reference.

Figure 28. Data Options for Caseload Information



Note: After entering or amending any information in the Epidemiology and Service Utilization Sheet, click the “Update Cost and Epidemiology Estimates” button in the *Maintenance Functions* section of the Homepage to update all sheets and calculations.

Incorporate Other Reference Points for Estimating Caseloads

Best Estimate columns (columns D and I) have an embedded formula to calculate caseload figures using the data provided as the Basis for Estimate in columns F and K and the known events entered in rows 7–13. The basic structure for the formulas in columns D and I is the same. For example, **Cell D15** in Figure 29 (Best Estimate for the number of women requiring Basic Antenatal Care) has the following formula:

=IF(E15=0,births_A*F15,E15)

This formula means that—

> If Cell E15 (Basis for Estimate in No.) is 0, then Cell D15 (Best Estimate for the number of women requiring Antenatal Care) equals (the value of the cell named) births_A x F15 (Basis for Estimate in %).
>
> Otherwise, Cell D15 (Best Estimate) equals Cell E15 (Basis for Estimate in No.).

In the default setting of the CES Model template, "**births_A**" contained in the formula is a range name referencing Cell D8, which is the Best Estimate for the total number of births in the population. Naming cells and using them in the formula makes it easier to understand the meaning of the formula.

In the above example, if there is any figure in the Basis for Estimate in No. (Cell E15), the embedded formula copies that value from Cell E15 to D15—the Best Estimate for the number of women requiring Antenatal Care. If, on the other hand, the number of women requiring Antenatal Care is not available, the spreadsheet calculates the Best Estimate as a proportion of total births using the percentage given in the Best Estimate in % (Cell F15).

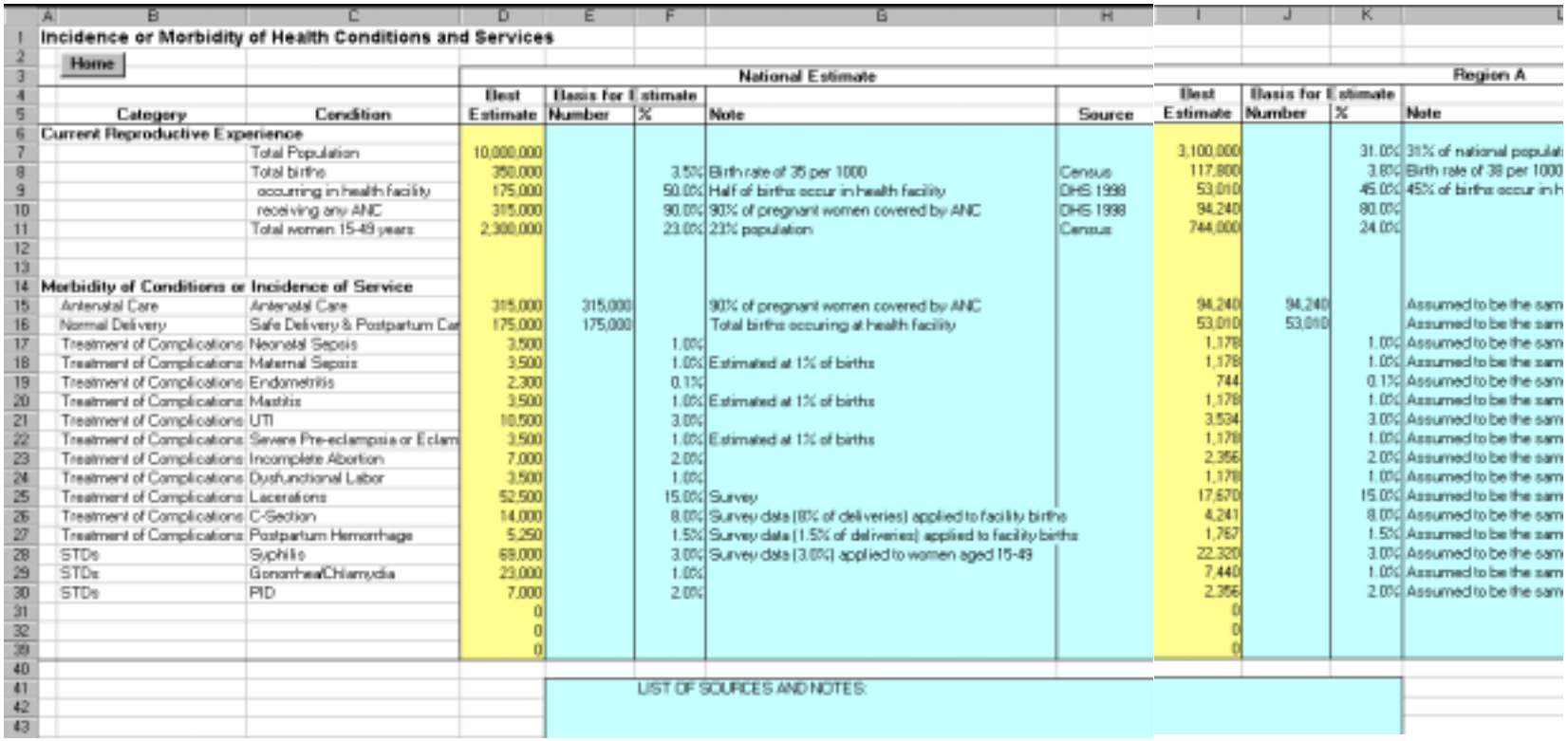
In the CES Model, the following five cells are named and used in the formula in the default setting of the Epidemiology and Service Utilization Estimate worksheet.

Cell Number	Cell Name	Definition
D7	Total_popA	The total number of people in the target population for Scenario A.
D8	Births_A	Total number of births occurring in the population in one year for Scenario A.
D9	Births_in_fac_A	Total number of births occurring in any health facility for Scenario A.
D10	Anc_A	Total number of pregnant women receiving any antenatal care by health worker for Scenario A.
D11	WRA_A	Total number of women aged 15–49 in the target population for Scenario A.
An identical set of cell names corresponding to Scenario B are set up in cells, I7, I8, I9, I10, and I11.		

The user may select RH conditions and services that reference different base populations than those listed in the box above. Additional reference populations may be entered in rows 12 and 13 and range names created (using standard Excel procedures) to identify them. Adjustments will then be necessary to the formulas in Column D (Best Estimate), shaded in yellow, so that specific conditions and services reference the new base population (through the new range name). This involves amending the formula by replacing the inappropriate range name with the correct reference of the additional base population.

> ✍ **Note:** If Treatment Cost sheets are added or deleted after formulas are amended or target population data entered, and the list of conditions is updated, it will be necessary to check—and amend as necessary—the formula or estimates in columns D, E, and/or F to re-assign the correct references in the formulas in accordance with the new ordering of the list of conditions.

Figure 29. Example of Epidemiology and Service Utilization Estimate Sheet



	A	B	C	D	E	F	G	H	I	J	K	L
1	**Incidence or Morbidity of Health Conditions and Services**											
2		Home										
3				National Estimate					Region A			
4				Best	Basis for Estimate				Best	Basis for Estimate		
5		Category	Condition	Estimate	Number	%	Note	Source	Estimate	Number	%	Note
6		**Current Reproductive Experience**										
7			Total Population	10,000,000					3,100,000		31.0%	31% of national populati
8			Total births	350,000		3.5%	Birth rate of 35 per 1000	Census	117,800		3.8%	Birth rate of 38 per 1000
9			occurring in health facility	175,000		50.0%	Half of births occur in health facility	DHS 1998	53,010		45.0%	45% of births occur in h
10			receiving any ANC	315,000		90.0%	90% of pregnant women covered by ANC	DHS 1998	94,240		80.0%	
11			Total women 15-49 years	2,300,000		23.0%	23% population	Census	744,000		24.0%	
12												
13												
14		**Morbidity of Conditions or Incidence of Service**										
15		Antenatal Care	Antenatal Care	315,000	315,000		90% of pregnant women covered by ANC		94,240	94,240		Assumed to be the sam
16		Normal Delivery	Safe Delivery & Postpartum Ca	175,000	175,000		Total births occuring at health facility		53,010	53,010		Assumed to be the sam
17		Treatment of Complications	Neonatal Sepsis	3,500		1.0%			1,178		1.0%	Assumed to be the sam
18		Treatment of Complications	Maternal Sepsis	3,500		1.0%	Estimated at 1% of births		1,178		1.0%	Assumed to be the sam
19		Treatment of Complications	Endometritis	2,300		0.1%			744		0.1%	Assumed to be the sam
20		Treatment of Complications	Mastitis	3,500		1.0%	Estimated at 1% of births		1,178		1.0%	Assumed to be the sam
21		Treatment of Complications	UTI	10,500		3.0%			3,534		3.0%	Assumed to be the sam
22		Treatment of Complications	Severe Pre-eclampsia or Eclam	3,500		1.0%	Estimated at 1% of births		1,178		1.0%	Assumed to be the sam
23		Treatment of Complications	Incomplete Abortion	7,000		2.0%			2,356		2.0%	Assumed to be the sam
24		Treatment of Complications	Dysfunctional Labor	3,500		1.0%			1,178		1.0%	Assumed to be the sam
25		Treatment of Complications	Lacerations	52,500		15.0%	Survey		17,670		15.0%	Assumed to be the sam
26		Treatment of Complications	C-Section	14,000		8.0%	Survey data (8% of deliveries) applied to facility births		4,241		8.0%	Assumed to be the sam
27		Treatment of Complications	Postpartum Hemorrhage	5,250		1.5%	Survey data (1.5% of deliveries) applied to facility births		1,767		1.5%	Assumed to be the sam
28		STDs	Syphilis	69,000		3.0%	Survey data (3.0%) applied to women aged 15-49		22,320		3.0%	Assumed to be the sam
29		STDs	Gonorrhea/Chlamydia	23,000		1.0%			7,440		1.0%	Assumed to be the sam
30		STDs	PID	7,000		2.0%			2,356		2.0%	Assumed to be the sam
31				0					0			
32				0					0			
39				0					0			
40												
41					LIST OF SOURCES AND NOTES:							
42												
43												

Step 10: Estimate Total Medical Equipment Needs at Health Facilities

There are two elements to the process of estimating the total medical equipment requirements of the health facilities covering the target population. The user first needs to identify the equipment needs of each type or level of facility and second ascertain the number of health facilities of each level or type. This step corresponds with the activities for estimating the caseload data to calculate the total drug and supply needs described in Step 9.

Addressing the first component was started in Step 6: Set up the Medical Equipment Lists, which describes how to develop essential medical equipment packages. The CES model allows the delineation of up to four equipment packages, each of which would support the treatment or delivery of one or more of the reproductive health conditions or services of interest.

The process continues with the determination of the quantity of each medical equipment package needed by each facility. This will depend on the level or type of facility, the conditions it treats or services offered, and on the volume of reproductive health conditions and services handled. For example—

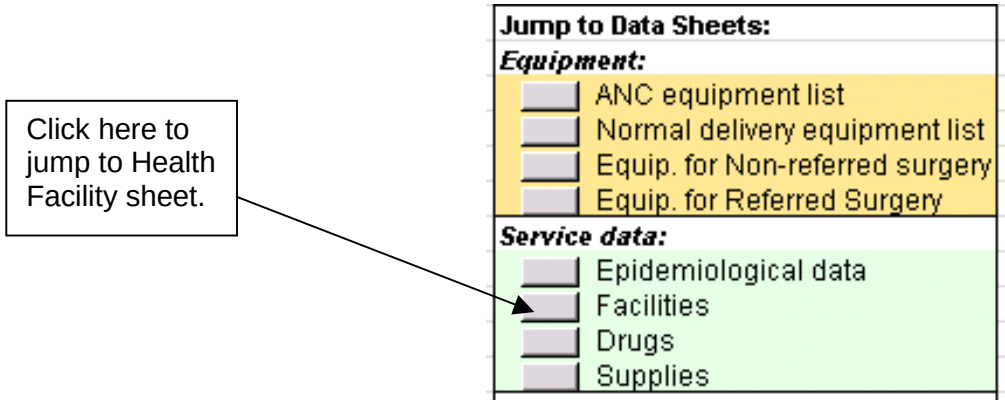
- If a small district hospital generally undertakes a single Cesarean section a week, it would require two of the packages containing equipment used in this operation (one for backup if any equipment fails in the first package). A larger provincial hospital that does two to three C-sections a day would probably need at least five packages (backups for packages that are not available because they are being cleaned and sterilized as well as for equipment failures or loss).

- For an MCH clinic, think about how many health workers are taking vital signs at any given time. If one person takes the blood pressure of patients before they go in to see the nurse or doctor, then the clinic will need only one blood pressure cuff and stethoscope (with perhaps a second as a backup). If there is only one doctor or nurse examining the pregnant women, the clinic will only need one or two fetoscopes.

The result of this exercise is to assign to each level of care or to each facility type a factor representing the number of each medical equipment package that should be available to the facility to provide quality services. These factors are entered into the **Health Facility sheet** of the CES Model (see Figure 31). The Health Facility sheet is accessed by clicking on the "Facilities" button in the *Jump to Data Sheets* section of the Homepage (see Figure 30).

The second component is the straightforward count of the number of health facilities included in the target population. These numbers are also entered into the Health Facility sheet.

Figure 30. Jumping to the Health Facility Sheet



Health Facility Sheet

The sheet contains two sections. They are designed to help users count the number of facilities with different sizes (based on the number of maternity beds) and types of services within the one or two target populations selected for assessment (e.g., all health facilities or public health facilities; all facilities in the country or all facilities in the selected geographical or administrative area).

1. The default setting of the template contains four types of facilities—*hospital*, *health center*, *maternity home/nursing home*, and *dispensary*. In addition, hospitals are divided into three sizes based on the number of maternity beds, as a proxy for the size of facility and service volume. The headings in columns C, D, E and F, are copied automatically from cell A1 of each medical equipment package sheet.

2. If the level of care system in a particular country differs from the default settings, the row headings (Column A) may be overtyped with suitable alternative text that matches the situation under analysis. If there are fewer levels of care in the country situation than the default, the extra rows may be left blank. The spreadsheet, however, will not accommodate more levels than in the default as this would necessitate the insertion of extra rows, which would affect embedded formulas.

3. Assign the level of care to each type of facility in Column B.

4. Enter the number of each type of facility for the target population in Column B.

5. For each type of equipment package, enter the number of packages per facility that is considered the minimum necessary to provide the selected services at each type of facility. Enter 0 if the service is not provided. The total number of equipment packages that is necessary for the listed facilities to provide selected types of reproductive health services is automatically calculated in row 16 (for Scenario A) and row 33 (Scenario B).

6. If a second scenario is being analyzed, repeat steps 1–4 for the second target population.

Figure 31. Example of Health Facility Sheet

	A	B	C	D	E	F	G
1	**Health Facilities Offering Various RH Services**			Home			
2							
3							
4	SCENARIO A						
5				Number of equipment packages (0 if not offered)			
6					Normal		
7	Type of Facility	Level of Care	No. of Facilities	Antenatal Care	Delivery	Non-referred Surgery	Referred Surgery
8	Hospitals 1-10 maternity beds	3	50	1	1	1	1
9	Hospitals 11-20 maternity beds	3	30	1	2	2	2
10	Hospitals >20 maternity beds	3	16	2	3	3	3
11	Total Hospitals		96	112	158	158	158
12	Maternity/Nursing Homes	2	52	1	1	0	0
13	Health centers	2	315	1	1	0	0
14	Dispensaries	1	1074	1	0	0	0
15							
16			Total	1553	525	158	158
17							
18							
19							
20							
21	SCENARIO B						
22				Number of equipment packages (0 if not offered)			
23	Type of Facility	Level of Care	No. of Facilities	Antenatal Care	Normal Delivery	Non-referred Surgery	Referred Surgery
25	Hospitals 1-10 maternity beds	3	30	1	1	1	1
26	Hospitals 11-20 maternity beds	3	10	2	1	2	2
27	Hospitals >20 maternity beds	3	8	2	1	2	3
28	Total Hospitals		48	66	48	66	74
29	Maternity/Nursing Homes	2	3	1	1	0	0
30	Health centers	2	247	1	1	0	0
31	Dispensaries	1	662	1	0	0	0
32	0						
33			Total	978	298	66	74

When updating the Cost Estimates (click on “Update cost and epidemiology” estimates in the *Maintenance Functions* section of the Homepage), the total number of equipment packages for each type of service is transferred to the **Cost Estimate Summary Sheet** to provide the data necessary for the total medical equipment costs to be generated.

Stage 3—The Results

Step 11: Estimates of the Episodic Cost of Drugs and Supplies for Each Condition or Service

Cost Information on the Treatment Sheets

The CES Model automatically calculates three types of summary costs for each condition or service as data are entered in the blue-shaded sections of the Treatment Cost Sheets (see Figure 32). The drug costs per episode, supply costs per episode, and total costs per episode (the sum of drug and supply figures) are found in cells Q25, P57, and P59, respectively.

Single Treatment Option

To account for conditions or services that have more than a single treatment option, the spreadsheet weights the cost per episode for each drug and supply item by the percentage of cases managed by each option, displaying the result in the last column headed Wgtd. Av. Tx. Cost (Weighted Average Treatment Cost).

For conditions and services that have only a single treatment option (i.e., 100% of cases are managed in this way), the drug cost per episode is multiplied by 1 and so the figures displayed in columns P and Q are identical. This cost for all drug items is summed at the bottom of the Drug Section (Cell Q25). Similarly for supply items, the cost per episode is identical in columns O and P, and summed in Cell P57. The total episodic commodity cost for drugs and supplies for the treatment appears in Cell P59.

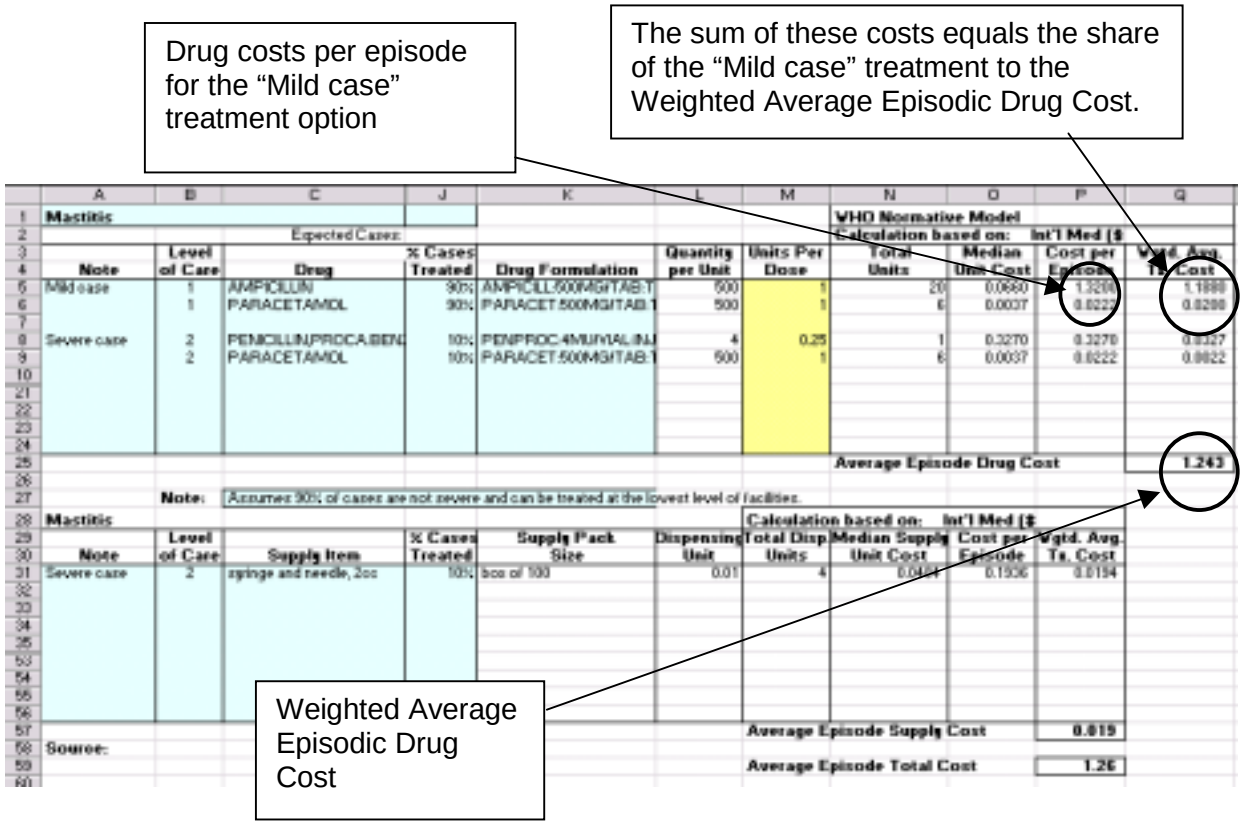
Multiple Treatment Options

When there is more than one treatment option (see Figure 32), the cost of each drug (and supply item) is weighted according to the percentage of cases treated with each option, which will be less than 1. This allows an episodic drug (and supply) cost to be determined, which takes into account the proportion of cases that are managed with the alternative treatment options.

In Figure 32, there are two treatment options identified for mastitis: one for mild cases and the second for severe cases. In this example, the CES Team had agreed that, on average, 90 percent of patients diagnosed with mastitis in that population could be considered mild cases, with the remaining 10 percent the severe cases requiring the alternative treatment.

Thus 90% of cases are treated with ampicillin and paracetamol (in oral form) and the cost per episode for each drug is multiplied by 0.9 (the mild case treatment *weight)*. Ten percent of cases receive the severe case treatment (penicillin in IV/IM form, and paracetamol) and the cost per episode for each drug is multiplied by 0.1 (the severe case treatment *weight).* The sum of all the individual weighted drug costs is the “Weighted Average Episodic Drug Cost.”

Figure 32. Example of Episodic Costs of the Treatment Cost Sheet (Some columns and rows are hidden.)



	A	B	C	J	K	L	M	N	O	P	Q
1	Mastitis							VHO Normative Model			
2			Expected Cases:					Calculation based on:		Int'l Med ($	
3		Level		% Cases		Quantity	Units Per	Total	Median	Cost per	Vgtd. Avg.
4	Note	of Care	Drug	Treated	Drug Formulation	per Unit	Dose	Units	Unit Cost	Episode	Tx. Cost
5	Mild case	1	AMPICILLIN	90%	AMPICILL 500MG/TAB:1	500	1	20	0.0660	1.3200	1.1880
6		1	PARACETAMOL	90%	PARACET 500MG/TAB:1	500	1	6	0.0037	0.0222	0.0200
7											
8	Severe case	2	PENICILLIN,PROCA,BEN	10%	PENPROC 4MU/VIAL/INJ	4	0.25	1	0.3270	0.3270	0.0327
9		2	PARACETAMOL	10%	PARACET 500MG/TAB:1	500	1	6	0.0037	0.0222	0.0022
10											
21											
22											
23											
24											
25									Average Episode Drug Cost		1.243
26											
27		Note:	Assumes 90% of cases are not severe and can be treated at the lowest level of facilities.								
28	Mastitis							Calculation based on:		Int'l Med ($	
29		Level		% Cases	Supply Pack	Dispensing	Total Disp	Median Supply	Cost per	Vgtd. Avg.	
30	Note	of Care	Supply Item	Treated	Size	Unit	Units	Unit Cost	Episode	Tx. Cost	
31	Severe case	2	syringe and needle, 2cc	10%	box of 100	0.01	4	0.0411	0.1936	0.0194	
32											
33											
34											
35											
53											
54											
55											
56											
57								Average Episode Supply Cost		0.019	
58	Source:										
59								Average Episode Total Cost		1.26	
60											

The primary purpose of the spreadsheet is to determine the weighted average treatment costs of multiple regimens selected. The sum of all the individual drug weighted costs per episode is shown in Column Q in this example US$1.243. Further manual manipulation of the drug cost data presented in each Treatment Cost Sheet can also provide additional useful cost information.

- **Share of the weighted average episodic drug cost contributed by the first treatment option** is obtained by adding the individual drug weighted costs for the first option from Column Q. In the example in Figure 33 this is US$1.188, for ampicillin, plus US$0.02, for paracetamol, for a total of US$1.21.

- **Share of the weighted average episodic cost drug contributed by the second treatment option** is the sum of the weighted average costs for the drugs used in the "Severe case" option—penicillin and paracetamol—and equals US$0.0349 (US$0.0327 plus US$0.0022).

- **Total drug cost per episode for first treatment option** is the sum of the cost per episode (Column P) for each drug, and in the example in Figure 33, is US$1.32 for ampicillin plus US$0.0222 for paracetamol—for a total of US$1.3422.

- **Total drug cost per episode for second treatment option** is likewise calculated from Column P and totals US$0.3492.

Similar formulas in the lower section of the Treatment Cost Sheet estimate the **Weighted Average Episodic Supply Cost**. And similar manual computations can provide the supply costs per episode for each of the multiple treatment options.

The sum of the Weighted Average Episodic Drug Cost and Weighted Average Episodic Supply Cost is the **Weighted Average Episode Total Cost** (Cell P59).

These three total costs per condition or service are then extracted to the Cost Estimate Summary and used for estimating the population-based total requirements (Figure 35).

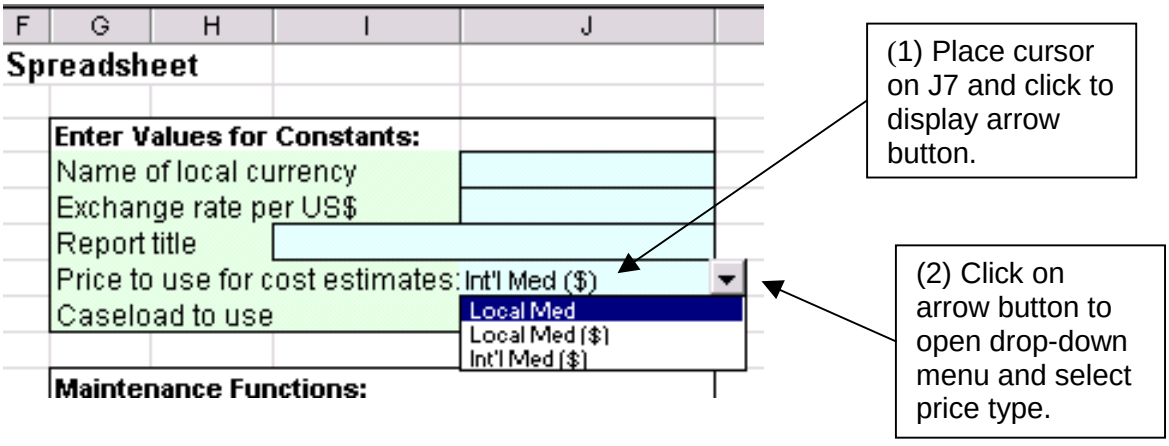
Options for Displaying the Cost Information in the Treatment Cost Sheets

Providing the user has entered data for local currency costs and international (US$) costs for each drug and supply item as well as an exchange rate for the local currency to the US$, then from the Homepage, users can opt to have the price shown in—

- Local Median prices in local currency: **Local Med**
- Local Median prices in US dollars: **Local Med ($)**
- International Median prices in US dollars: **Int'l Med ($)**

In the *Enter Values for Constants* section of the Homepage, click on Cell J7, to the right of "Price to use for cost estimates." The arrow button for the drop-down menu will appear at the right edge of the cell; click on the button and select one of the options displayed (see Figure 33). All calculations in the CES spreadsheets will be completed using the selected price data. The user can change the selection any time to display the data and results for an alternative price set.

Figure 33. Changing the Price Data to Use



What If Application?

The Episodic Costs for drugs and supplies are determined by the drugs and supplies selected, the unit costs, the treatment regimens, and the proportion of cases treated by alternative treatment options. Any changes in these variables will result in changes in the episodic costs. The CES spreadsheet therefore becomes a powerful tool to quickly and easily assess the implications for the episodic cost of, for example, substitution of one drug by another, selection of supplier (and thus cost), or variation in duration or frequency of medication.

It is useful to print the Treatment Cost Sheets and Cost Estimate Summary Sheet prior to making changes to any variables so that comparison between the original estimates and the revised estimates is facilitated.

Printing the Results

All of the Treatment Cost Sheets can be printed at one time by clicking on "Treatment Cost Sheets" in the *Select Sheets to Print* section of the Homepage. If it is desired to print an individual treatment sheet, then jump to the sheet using the buttons in the Homepage or click on the desired treatment sheet tab. Then follow standard Excel steps for printing from sheets (highlight the area to be printed, preview and adjust the range and other print options as appropriate, and print).

The date of the print run, the Excel file name, and the sheet number will automatically appear in the header and footer of the Treatment Cost Sheets when printed from the Homepage.

Step 12: Estimates of Total Drug and Medical Supply Requirements and Costs

With the completion of steps 1 through 9, the CES Model has sufficient information to calculate the needs for drugs and supplies for the selected reproductive health conditions and services for the population of interest, based on the selected treatment options and the estimated caseload. To ensure that the correct results, which take account of the latest changes and data entry, are displayed and ready for printing, update the spreadsheet calculations by clicking on the "Update Cost and Epidemiology estimates" button on the Homepage (see Figure 26).

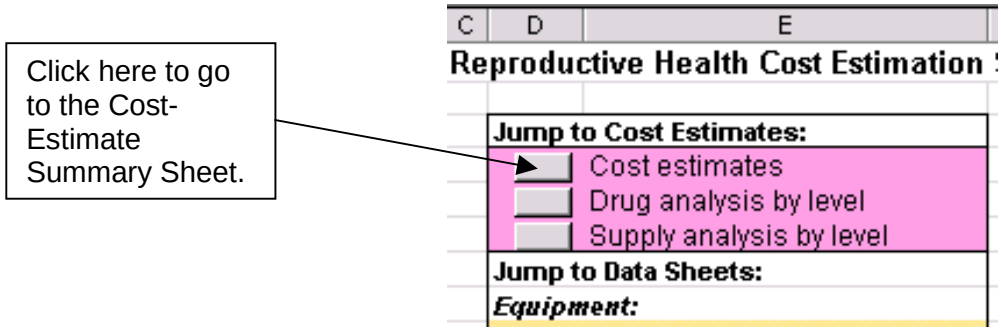
Clicking on the "Update Cost and Epidemiology estimates" button in the *Maintenance Functions* section of the Homepage transfers the following updated information to the Cost Estimate Summary Sheet (Figure 35).

- From the Treatment Sheets—
  Names and types of reproductive health conditions and services (from Cells A1 and G1 to columns A and B of the Cost Estimate Summary sheet)
  Average weighted case cost for drugs and supplies and the total of the drugs and supply requirements per case (from Cells Q25, P57, and P59 to columns C, D, and E of Cost Estimate Summary Sheet)

- From the Epidemiology and Service Utilization Estimate Sheet—
  Estimated number of cases (from Column D to Column F of Cost Estimate Summary Sheet)

To view the results, click the “Cost estimate” button on the Homepage (Figure 34) or click on the Cost Estimate sheet tab.

Figure 34. Jumping to the Cost-Estimate Summary Sheet



Cost-Estimate Summary Sheet

The CES Model reports results of estimation in the Cost-Estimate Summary Sheet, which consists of two sections:

1. Total Drug and Supply Costs
2. Total Health Equipment Costs (described in Step 13)

The entire sheet is protected against any data entry, having been specifically designed to be completed by transferring data from other parts of the Model.

By combining the cost per case and the estimated caseload, the Total Weighted Costs for drugs, supply items, and the sum of these are calculated and presented in columns G, H, and I for the first population set (Scenario A) and in columns K, L, and M for the second population set (Scenario B).

In the example shown in Figure 35, estimated total drug and supply needs are shown for the following two population sets:

1. National Estimate
2. Region A

These summary figures are the products of all the preceding steps and, therefore, will change if any data in the Model change. In using the CES Model for the scenario analysis, users should return to this Summary table to see the impact of any changes made to drug selection, drug or supply item costs, treatment options, or other variables on the total commodity needs.

Printing the Results

The Cost Estimate Summary report can be printed by clicking on the “Cost estimates” button in the *Select Sheets to Print* section of the Homepage. The sheet will first appear in the Print Preview window, providing the opportunity to change print settings before the image is sent to the printer.

Figure 35. Drug and Supply Section of Cost Estimate Summary Sheet with Sample Data

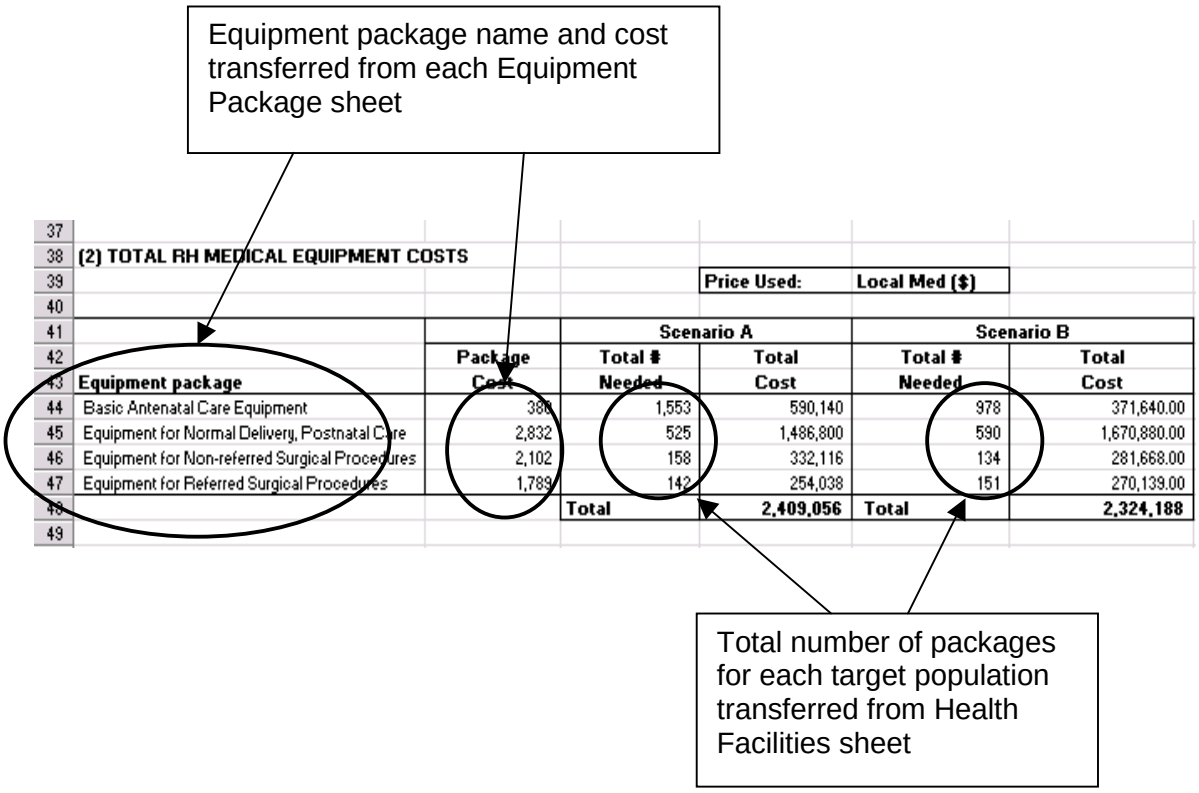
	A	B	C	D	E	F	G	H	I	J	K	L	M
1	**Cost Estimate Summary**	Home	Update Cost Estimate										
2													
3	(1) TOTAL RH DRUG AND SUPPLY COSTS							Price Used: m'l Med ($)					
4													
5			Costs/Currency:m'l Med ($)			National Estimate				Region A			
6			Average Weighted Case Cost *			Estimated	Total Weighted Cost*			Estimated	Total Weighted Cost*		
7	**Treatment type**	**Health problem/Condition**	**Drugs**	**Supplies**	**Total**	**# Cases**	**Drugs**	**Supplies**	**Total**	**# Cases**	**Drugs**	**Supplies**	**Total**
8	Antenatal Care	Antenatal Care	6.55	0.95	7.49	315,000	2,062,537	298,242	2,360,779	94,240	617,059	89,226	706,285
9	Normal Delivery	Safe Delivery & Postpartum Care	3.76	4.16	7.92	175,000	658,469	727,388	1,385,857	53,010	199,460	220,336	419,796
10	Treatment of Complications	Neonatal Sepsis	0.82	1.75	2.58	3,500	2,878	6,138	9,016	1,178	969	2,066	3,034
11	Treatment of Complications	Maternal Sepsis	19.15	3.19	22.34	3,500	67,029	11,162	78,192	1,178	22,560	3,757	26,317
12	Treatment of Complications	Endometritis	1.08		1.08	2,300	2,489		2,489	744	805		805
13	Treatment of Complications	Mastitis	0.74	0.02	0.76	3,500	2,584	68	2,652	1,178	870	23	892
14	Treatment of Complications	UTI	1.54		1.54	10,500	16,149		16,149	3,534	5,435		5,435
15	Treatment of Complications	Severe Pre-eclampsia or Eclampsia	14.12	5.19	19.31	3,500	49,410	18,166	67,576	1,178	16,630	6,114	22,744
16	Treatment of Complications	Incomplete Abortion	0.11	2.62	2.73	7,000	756	18,322	19,078	2,356	254	6,167	6,421
17	Treatment of Complications	Dysfunctional Labor	4.52	0.75	5.27	3,500	15,819	2,619	18,438	1,178	5,324	882	6,206
18	Treatment of Complications	Lacerations	0.11	0.84	0.95	52,500	5,670	44,200	49,870	17,670	1,909	14,876	16,785
19	Treatment of Complications	C-Section	14.27	14.49	28.77	14,000	199,826	202,905	402,731	4,241	60,530	61,463	121,993
20	Treatment of Complications	Postpartum Hemorrhage	16.66	31.45	48.11	5,250	87,457	165,096	252,553	1,767	29,436	55,566	85,002
21	STDs	Syphilis	0.48	0.85	1.33	69,000	33,289	58,629	91,829	22,320	10,804	18,901	29,705
22	STDs	Gonorrhea/Chlamydia	6.09		6.09	23,000	140,156		140,156	7,440	45,338		45,338
23	STDs	PID	6.16	0.07	6.23	7,000	43,123	474	43,598	2,356	14,514	160	14,674
24													
25													
26													
27													
28													
29													
30													
31													
32													
33						Total	3,387,752	1,553,209	4,940,961	Total	1,031,895	479,536	1,511,432

Step 13: Estimates of Total Medical Equipment Requirements and Costs

When the Facility Worksheet is completed, the estimated total medical equipment needs will be calculated by the formula embedded in the lower section of the Cost Estimate Summary Sheet by combining the unit cost of each equipment package with the total estimated number of packages needed (Figure 36).

As in the case of total drug and supply requirements and cost, the estimated total medical equipment requirements and costs are also based on a number of assumptions and decisions made during the Model-building process. By shifting these assumptions, users can evaluate cost implications of potential changes in the selection and in the number of equipment items to be included in the basic equipment packages, the number of packages to be allocated to each type of facility, and the prices of each item.

Figure 36. Medical Equipment Section of the Cost-Estimate Summary Sheet



The quantities of each medical equipment package and their costs represent the expenditures required to satisfactorily equip the target number of health facilities from scratch. It is most likely that health facilities already possess some of the equipment identified as necessary to provide appropriate care. Hence, existing equipment should be taken into account when determining the cost of equipment needs.

One of the CES Survey instruments—the Health Facility Survey—collects information on currently available equipment at health facilities. Data on the "Number available and satisfactory" is obtained for equipment packages as defined in the CES Model (the default equipment groupings being for Basic Antenatal Care, Normal Delivery, Non-referred Surgery,

and Referred Surgery). A comparison between the currently available medical equipment and the numbers of packages calculated in the Model as necessary to meet the needs of the services offered will help determine the resources required, if any, to bring equipment holdings up to standard.

Printing the Results

The Estimates of Total Medical Equipment Requirements and Costs report is pointed as part of the Cost Estimate Summary Report (see Step 12), which includes the drugs and medical supply results. If only the results for medical equipment are required, use standard Excel printing steps.

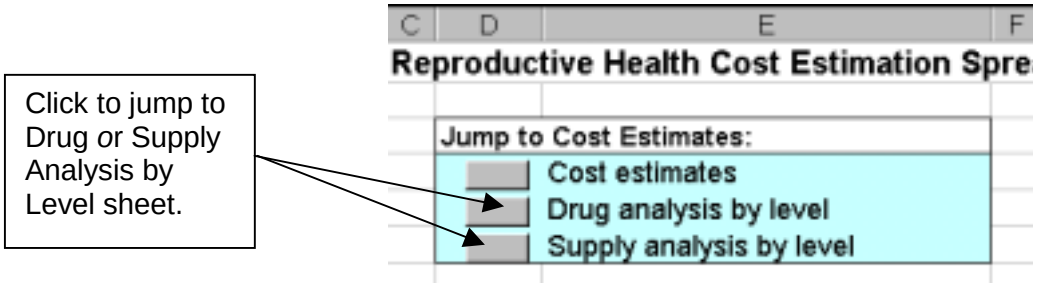
Step 14: Analyses of Drugs by Level and Supplies by Level

Each drug and supply item is allocated a number relating to the level of care at which the treatment or service utilizing that drug or supply item is performed. (See Step 8.) The number refers to the lowest level of care (or facility level) in the health system at which a particular condition is treated or service is provided. The number of levels will depend upon the particular situation being assessed by the CES methodology. For example, a health system may be categorized as comprised of three levels—(1) health posts, (2) health centers, and (3) hospitals. If the lowest level that basic antenatal care is offered is the health post, then the drugs and supply items used to provide basic antenatal care will be assigned Level 1. If second line treatment of puerperal sepsis, which requires IM and IV delivery of drugs, is only provided at hospitals, then the level of care for these drugs (and associated supplies) will be 3.

The CES Model can analyze drug and supply requirements by level of care, sorting the quantities and costs of commodities by the assigned level of care number. This analysis provides data on the costs of drugs and supplies for each level of care. Figure 38 shows a section from the report on "Drug analysis by level."

Both the "Drug analysis by level" and "Supply analysis by level" reports can be displayed on screen by clicking on the appropriate buttons in the *Jump to Cost Estimates* section of the Homepage (or by selecting the Drug by Level or Supply by Level Sheet tabs), as shown in Figure 37.

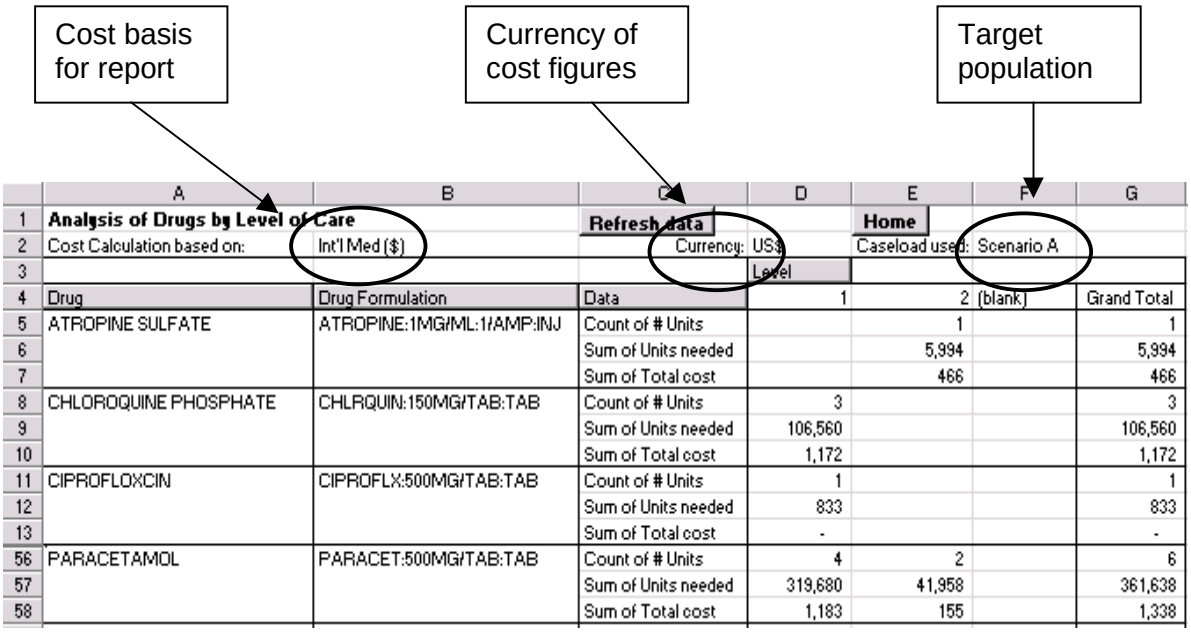
Figure 37. Jump to Drug or Supply Analysis by Level Sheet



Drugs by Level

The Model uses an Excel function (called a Pivot Table) to analyze the data on the quantities and costs of drugs and present it in the Drug Analysis by Level sheet ordered by drug name and disaggregated between the levels of care.

Figure 38. Analysis of Drugs by Level of Care



	A	B	C	D	E	F	G
1	**Analysis of Drugs by Level of Care**		Refresh data		Home		
2	Cost Calculation based on:	Int'l Med ($)	Currency:	US$	Caseload used:	Scenario A	
3				Level			
4	Drug	Drug Formulation	Data	1	2	(blank)	Grand Total
5	ATROPINE SULFATE	ATROPINE:1MG/ML:1/AMP:INJ	Count of # Units		1		1
6			Sum of Units needed		5,994		5,994
7			Sum of Total cost		466		466
8	CHLOROQUINE PHOSPHATE	CHLRQUIN:150MG/TAB:TAB	Count of # Units	3			3
9			Sum of Units needed	106,560			106,560
10			Sum of Total cost	1,172			1,172
11	CIPROFLOXCIN	CIPROFLX:500MG/TAB:TAB	Count of # Units	1			1
12			Sum of Units needed	833			833
13			Sum of Total cost	-			-
56	PARACETAMOL	PARACET:500MG/TAB:TAB	Count of # Units	4	2		6
57			Sum of Units needed	319,680	41,958		361,638
58			Sum of Total cost	1,183	155		1,338

The spreadsheet calculates three results: Count of # Units, Sum of Units needed, and Sum of Total cost.

- **Count of # Units** is a count of the number of times the drug is listed on the set of Treatment Sheets. For example in Figure 38 paracetamol is listed a total of six times on Treatment Sheets (four times at Level 1 and twice at Level 2).

- **Sum of Units needed** is the total quantity of the drug required for the caseload and treatments provided at the health facilities in the CES exercise, by level of care.

- **Sum of Total cost** is the total cost of the above quantities by level of care.

> **Note:** Always update the Drug Analysis by Level sheet after selecting and displaying the sheet, after entering or amending any data in the Model, or when switching from one cost option to another. Click on the "Refresh data" button at the top of the sheet to ensure that the latest data are included in the analysis and displayed

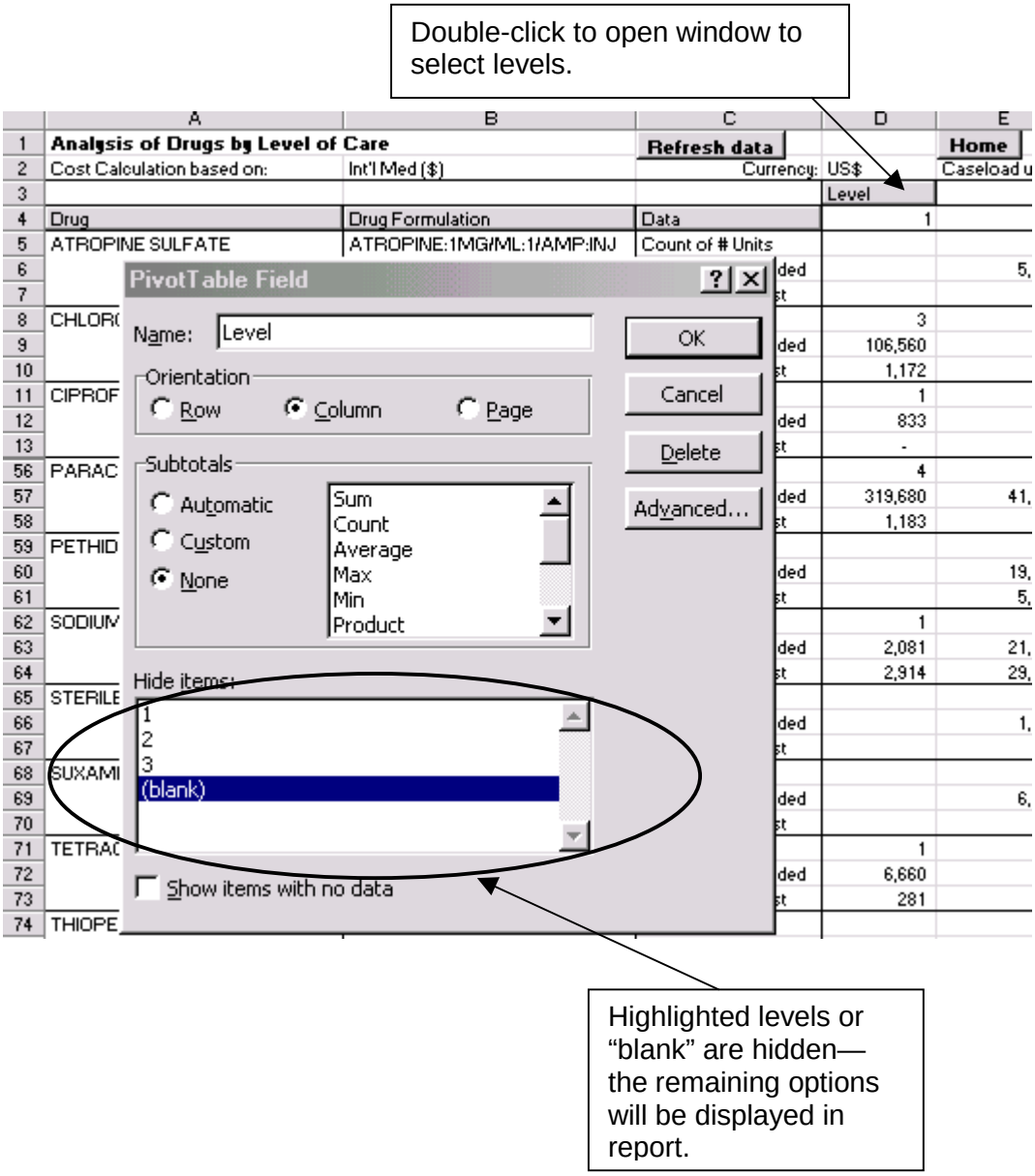
Display Options

The report can be displayed and printed to show the results for a single selected level or for any combination of the levels used in the CES exercise. The selection of which levels to display is made by double-clicking on the "Level" button in Cell D3, which opens a window (see Figure

39). Highlight the levels (or the "blank" option) that you wish to hide. Information relating to the level options that are *not* highlighted will be displayed in the report.

The "blank" option is useful for checking that all information has been correctly entered into the Treatment Sheet. For example, if a drug item has been entered, but no level of care input, then the quantities and costs of this item will appear in the "blank" column.

Figure 39. Selecting the Levels of Care to Display in the Drugs by Level Analysis



Supplies by Level

An identical process and analysis can be undertaken for medical supplies.

Printing the Results

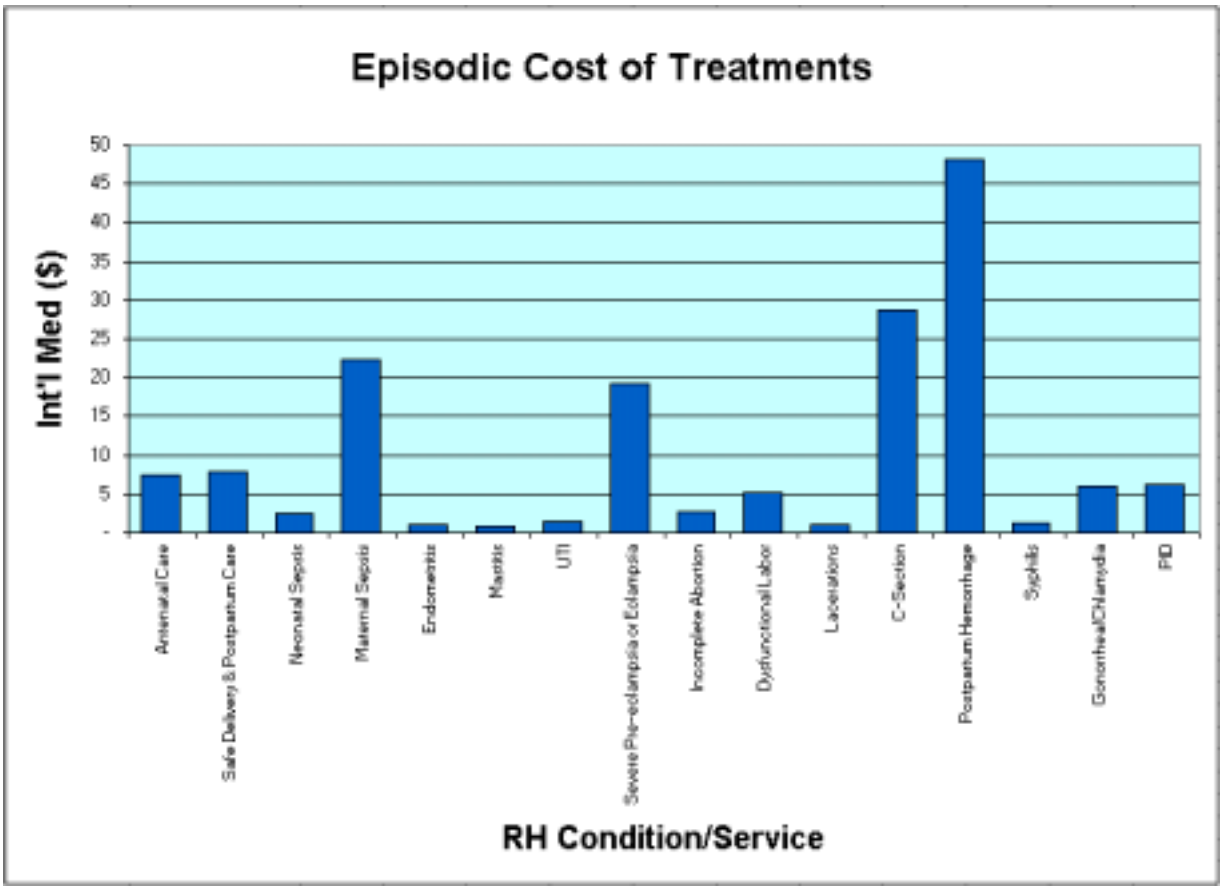
Both the Drugs by Level and Supplies by Level reports can be printed out through the usual Excel procedures: Highlight the area to be printed, preview and adjust the range and other print options as appropriate, and print.

Graphing the Results

One sheet, named “Graphs,” has been allocated in the spreadsheet to store graphs that the user may wish to prepare of the results of the analysis. Use this sheet rather than any of the other data entry or results sheets to save graphs, so that the risk of inadvertently corrupting the formulas and macros contained in these sheets is minimized.

One graph has been pre-installed to illustrate the kind of presentation of results that can be made from the results. See Figure 40.

Figure 40. Example Graph of CES Model Results



CHAPTER 6. ESTIMATING COMMODITY COSTS—THE ACTUAL MODEL

Rationale for the Actual Model

For a number of reasons, the manner in which treatments and services are offered in health facilities may differ from policy or national standard guidelines. Prescribers may not be aware of the policy or STGs, or they may not have been informed of changes in the guidelines and, consequently, be working in compliance with out-of-date protocols. The correct drugs or supplies may not be available to the health provider in sufficient quantities—or at all—and treatment is offered as best as can be, given these commodity deficiencies. Training of providers may have been completed a long time ago, refresher training nonexistent or weakly reinforced, resulting in practice at variance with STGs.

Commodity purchase costs may vary between centralized and decentralized systems. The cost of drugs and supplies bought, for example, by a single hospital from the local town or district market may well differ from the cost of the same items purchased competitively through a central dedicated procurement unit.

Hence the episodic—and thus total costs of reproductive health services—may be different in practice from those costs that were calculated with reference to centrally managed tenders and standard treatment guidelines determined by policy and that were obtained through the Country-Specific Model.

A comparison of cost estimates generated by the Country-Specific Model with those of the Actual Model provides the CES user with useful indications about the current situation in commodity management and in the provision of reproductive health services. For example, the results of the comparison can—

- Indicate a need to reexamine the appropriateness and feasibility of the standard treatment guidelines
- Point to potential inefficiencies in current commodity procurement
- Suggest where shortages exist in reproductive health commodities stocks
- Identify inappropriate prescribing practices by health care providers
- Highlight training needs of health care providers in the appropriate use of essential commodities

Assembling the Actual Model

The CES Survey (see Chapter 7) collects data on the prescribing practice of health professionals through the Health Care Provider Interview and a review of patient records and, collects information on commodity costs through the Health Facility Survey. The former data can be reviewed and summarized to indicate average “actual” treatment practice and this information recorded manually on the Treatment Sheets (see Chapter 5, Step 1) as the basis of the cost estimation exercise.

To prepare the Actual Model, copy the CES Model Template file, assign a new name to the file, and enter the data obtained from the CES Survey into the appropriate data sheets, by performing the following tasks.

1. Enter the currency and exchange rate and name for the report title into the Homepage, *Enter Values for Constants* section (see Chapter 5, Step 2).

2. Enter the names of the conditions and services and categories into the Treatment Sheets (see Chapter 5, Step 3).

3. Set up the Drug List, Supply List, and, as appropriate, the Medical Equipment Lists (Chapter 5, Steps 4, 5, and 6, respectively).

4. Enter the median commodity costs obtained from the Survey (Chapter 5, Step 7).

5. Enter data into the Treatment Sheets about the drugs prescribed and the medical supplies used by the average "actual" treatment practice (Chapter 5, Step 8).

Episodic Costs

At this stage the Actual Model has sufficient data entered to determine the episodic cost of reproductive health treatments and services based on the average actual treatment practice and actual costs for commodities. The comparison of the episodic costs from this exercise and those generated by the Country-Specific Model can suggest areas of reproductive health commodity management where further analysis and review can lead to the identification of problems and the determination of solutions designed to produce an improvement in the program. Table 1 provides a hypothetical example.

Table 1. Comparison of Country-Specific and Actual Episodic Costs for Selected RH Conditions

Condition	Country-Specific	Actual
Antenatal care	$5.65	$ 1.74
Delivery/birth	$5.22	$ 5.01
Sepsis	$5.35	$12.45
Syphilis	$3.63	$ 0.65
PID	$1.68	$ 0.92

The Country-Specific episodic costs are higher than the Actual episodic costs in four of the five conditions in this hypothetical situation. The following matrix presents some of the probable causes of the differences between the episodic costs by cross-tabulating the relationship of the two costs with whether or not the average actual episodic cost is at variance with the standard treatment guidelines.

Outcome of Comparison	Correspondence of Treatments	
	Actual Treatment Protocol Is at Variance with STG	Actual Treatment Protocol Is Similar to STG
Actual episodic cost is lower than Country-Specific episodic cost	Probable causes • Fewer drugs than contained in STGs are prescribed. • Shortage of drugs leads health providers to prescribe shorter courses of treatment (thus requiring fewer drugs).	Probable causes • Not all drug and supply costs are the responsibility of the health facility; patients are expected to pay out of pocket for some items. • STG includes superfluous items.
Actual episodic cost is greater than Country-Specific episodic cost	Probable causes • Health care providers prescribe branded rather than generic drugs. • Health care providers prescribe expensive alternatives of selected drugs. • Health care providers prescribe more drugs than are necessary. • Unnecessary tests are performed.	Probable causes • Commodity costs are higher than necessary.

Total Drug and Supply Costs

1. Enter the caseload data used in the Country-Specific Model (see Chapter 5, Step 9).

   Applying the "actual" model episodic cost to the caseload data will indicate the magnitude of the total costs of managing the reproductive health program for the target population under current practice, as compared with the ideal based on appropriate standard treatment guidelines.

2. The details of the episodic costs can be printed out using the Print Treatment Sheets button on the Homepage. Similarly, the Cost-Estimate Summary report can be printed.

> ✍ **Note:** The Actual Model depends upon the CES Survey to obtain the relevant information to be able to prepare the Treatment Cost Sheet and other data sheets. It is important, therefore, that the Survey instruments be reviewed closely and amended as appropriate to ensure that all required information is sought before the Survey is implemented.

CHAPTER 7. CONDUCTING THE CES SURVEY

By completing the Cost-Estimate Strategy spreadsheets for the Country-Specific Model, the user will have defined standard treatment guidelines and identified the essential equipment needs of the various levels of health care facilities. These are the benchmarks for the appropriate provision of reproductive health services for the setting in which the CES is being applied. The CES Survey collects information on the current manner in which reproductive health services are provided and, thus, allows comparison between standards set and actual practice. Data from the Survey is input into the CES Model to develop the Actual version of the model, which estimates treatment costs based on average actual treatment practice.

Objectives of the CES Survey

The CES Survey examines three aspects of reproductive health commodity management:

1. Service and Commodity Availability

    - Are appropriate drugs, medical supplies, and equipment available for health care providers to carry out the treatment recommended for selected reproductive health conditions based on the standard treatment guidelines?

2. Use of Reproductive Health Commodities

    - What drugs are prescribed and medical supplies used by health personnel in the provision of care?

    - How does actual practice differ from standard treatment guidelines and what are the cost implications?

3. Local Cost of Reproductive Health Commodities

    - How much are facilities actually paying for the essential commodities?

    - What are the hidden costs for pregnant women who purchase commodities when seeking reproductive health services?

Data obtained from the CES Survey can be used to—

- Adjust commodity needs estimated by the CES Country-Specific Model
- Reexamine the appropriateness and feasibility of the standard treatment guidelines used in the spreadsheets to derive RH commodity costs
- Identify inefficiencies in current commodity procurement
- Identify where reproductive health commodities are under- or oversupplied
- Ascertain inappropriate practices by health care providers
- Identify training needs of health care providers for appropriate use of essential commodities

Note: The CES Survey is designed to examine the assumptions made in developing the CES Models. Therefore, the survey should be conducted in conjunction with the CES Model, but the survey plan should be finalized after the standard treatment guidelines for the Model are selected.

The standard treatment guidelines selected for the Model become the norms against which actual treatment patterns and the availability of "essential" commodities are assessed. Without such agreed norms, meaningful data collection and analysis cannot be expected.

Components of the CES Survey

Five types of surveys can be conducted as part of the CES Survey. Seven template survey forms and instructions, listed below, are provided in this *Guide* (see Appendix C):

- Health Facility Survey
  - Health Facility Survey Form
- Health Care Practice
  - Health Care Practice Form
  - Patient Contact Form
- Health Care Provider Interview
  - Health Care Provider Interview
- Mothers Interview
  - Mothers Interview Form
- Pharmacy Survey
  - Pharmacy Survey Form
  - Pharmacy Simulated Purchase Survey Form

Table 2 displays the data components of each survey type, data collection methods used, and the aspects of commodity management that each component examines.

Sources of Data and Data Collection Method

The CES Survey combines multiple sources of data and data collection methods to verify the information obtained and validate the data collection methodology and instruments used.

Data collection methods used in the CES Survey are—

- Face-to-face interview
- Physical count or check
- Record review
- Simulated purchase

Table 2. CES Survey Instruments: Components, Data Collection Method, and Objectives

Survey Type	Survey Component	Data Collection Method	Objectives		
			Service & Commodity Availability	Use of Commodities	Local Commodity Cost
Health Facility Survey	Services and basic infrastructure at facilities	Interview Physical count Record review	✓		
	Current availability of tracer commodities	Physical count	✓		
	Past stock-out pattern of tracer commodities	Record review	✓		
	Facility purchase prices of tracer commodities	Record review			✓
Health Care Practice	Recorded prescribing and test ordering patterns	Record review		✓	
Health Care Provider Interview	Reported prescribing and test ordering patterns	Interview		✓	
Mothers Interview	Antenatal care received at the first visit	Interview	✓	✓	
	Reported use of drugs during pregnancy	Interview		✓	
	Commodities brought by mothers	Interview	✓		
	Out-of-pocket expenses	Interview			✓
Pharmacy Survey	Reported practices for advising pregnant women	Interview	✓	✓	
	Observed practices for advising pregnant Women	Simulated purchase	✓	✓	
	Commodity availability	Physical count	✓		
	Retail prices of tracer commodities	Interview Simulated purchase			✓

Service Availability

Information about reproductive health services is obtained from three sources (see also Table 3).

1. **Health Facility Survey (HFS)** asks about the types of reproductive health services a facility provides through an interview and it examines whether the facility is equipped with the basic infrastructure to support such services.

2. **Mothers Interview (MI)** asks when and what type of facilities pregnant women go to for antenatal care (ANC) and whether they received the services that the facility reports providing to pregnant women at their first ANC visit.

3. **Pharmacy Survey (PS)** investigates the role of retail pharmacies in providing ANC to pregnant women. Two methods—*face-to-face interviews* with pharmacy staff and *simulated purchases survey*—are used to verify whether pharmacy staff's reported information corresponds with actual behaviors in advising pregnant women.

Table 3. Service Availability

Data	Data Collection Method	Source of Data	Survey Instrument
Services provided at facility	Interview with health personnel and physical check of infrastructure	Staff and service records at health facility	HFS
Services provided to pregnant women at the first ANC visit	Interview with women attending ANC or in the postnatal ward	Pregnant and postnatal women	MI
Advice provided pregnant women visiting pharmacy	Interview with pharmacy staff	Pharmacy staff	PS
	Simulated purchase at pharmacy		

Commodity Availability

Information on the availability of the tracer commodities identified through the CES model-building process is obtained from three sources (see Table 4).

1. **Health Facility Survey (HFS)** uses two methods to evaluate the availability of key commodities at a facility. First, current availability of tracer commodities is examined by counting the stock in the facility at the time of the survey. Second, to take into account possible fluctuations in the stock level over time—for example, seasonal differences in demand and gaps in the supply cycle, the HFS also reviews the stock records from the last six months or more to count *average stock-out days per month* for tracer commodities.

2. **Mothers Interview (MI)** assesses the availability of commodities from the patients' point of view by asking what, if any, commodities pregnant women have to purchase outside the health facility and bring to the health facility for their deliveries.

3. **Pharmacy Survey (PS)** is designed to capture the role of the retail pharmacy as a source of reproductive health commodity supplies for pregnant women.

Table 4. Commodity Availability

Data	Data Collection Method	Source of Data	Survey Instrument
Commodities currently in stock at facility	Physical count at facility	Inventory at health facility	HFS
Days out of stock	Record review at facility	Stock record at health facility	
Commodity brought by mothers	Interview with postnatal women	Postnatal women	MI
Commodities currently in stock at pharmacy	Physical count at pharmacy	Pharmacy inventory	PS

Use of Commodities

How are the key commodities actually used when they are available at facilities? This is a key question for determining the commodity need, as well as for identifying issues with health care providers' current practices. The CES Survey captures both ***reported*** and ***recorded*** practice patterns from multiple sources of information, such as health care providers, medical records, clients (pregnant women), and pharmacy staff, using the following four survey instruments (see Table 5).

1. **Health Care Practice (HCP*)*** is designed to collect recorded information regarding drugs prescribed and tests ordered by health care providers. Information is collected through a review of medical records.

2. **Health Care Provider Interview (HCPI)** is a set of standardized questions designed to solicit information from health staff at facilities regarding what drugs they prescribe and tests they order for the target reproductive health conditions.

3. **Mothers Interview (MI)** verifies the information provided by health care providers through interviews and the review of antenatal care cards that women receive at the first ANC visit and use during their pregnancy.

4. **Pharmacy Survey (PS*)*** is designed to document what retail pharmacy staff say they advise pregnant women to do and what is actually observed by data collectors who pose as pregnant women themselves seeking advice from the pharmacy staff.

Table 5. Use of Commodities

Data	Data Collection Method	Source of Data	Survey Instrument
Recorded pattern of treatment practice	Record review at facility	Medical records	HCP
Reported pattern of treatment practice	Interview with health care providers at facility	Health care providers	HCPI
Services provided to pregnant women at the first ANC visit	Interview with women attending ANC and postnatal women	Pregnant and postnatal women	MI
Reported use of drugs during pregnancy	Interview with women attending ANC and postnatal women		
Reported practices by pharmacy staff in advising pregnant women	Interview with pharmacy staff	Pharmacy staff	PS
Observed pharmacy staff practices in advising pregnant women	Simulated purchase at pharmacy		

Local Commodity Cost

In a health system with centralized procurement, the unit cost of commodities, as used in the CES Model to estimate total costs, is likely to be based on bulk or high volume purchases (either from local or international suppliers). However, in a decentralized health care system, procurement of commodities may be conducted at the province or district level or at the individual facility level. A number of factors in the procurement process determine the price of a commodity, and purchasing prices of the same commodity at the local level may differ from the bulk purchase prices at the central level.

In addition, when patients are asked to bring necessary commodities to the facility because they are not available through the regular supply mechanism of the health system, the women have to buy these commodities at pharmacies or other shops at retail prices. In estimating commodity needs, it is important to capture these hidden costs borne by patients seeking reproductive health care.

The CES Survey collects data on local commodity costs using the following three survey instruments (see also Table 6).

1. **Health Facility Survey (HFS)** examines the last purchase prices of tracer commodities based on the standard treatment guidelines.

2. **Mothers Interview (MI)** asks postnatal women how much they paid for commodity items they purchased and brought for their deliveries.

3. In the face-to-face interview using the **Pharmacy Survey (PS)**, data collectors ask pharmacy staff to provide the quantity and prices of drugs or medical supplies that they usually recommend pregnant women purchase for their deliveries at health facilities. An inventory of a shorter list of tracer drugs also collects prices. Data collectors verify the information using the simulated purchase method.

Table 6. Local Commodity Costs

Data Collected	Data Collection Method	Source of Data	Survey Instrument
Last facility purchase prices	Record review at facility	Records at health facility	HFS
Women's out-of-pocket expenses	Interview with postnatal women	Postnatal women	MI
Reported retail prices	Interview with pharmacy staff	Pharmacy staff	PS
Observed retail prices	Simulated purchase at pharmacy		

Planning the Survey

Step 1: Form the CES Survey Team

The CES Survey requires expertise in several health-related areas. People with expertise in operations research and costing may need to be added to the team of experts assembled for the CES exercise. The CES Survey Team may be comprised of members with the following expertise:

- Drug Supply Manager
- Health Service Specialist
- Operations Research Specialist
- Reproductive Health Specialist
- Senior Nurse-Midwife
- Costing Specialist
- Administrative Assistant

Planning activities, to be carried out by the CES Team, include—

- Prepare a concept paper outlining the objectives, strategies, resources, and the utility of the CES tools for the proposed survey. This paper is useful during briefing meetings with stakeholders.

- Contact and brief key people in the Ministry of Health, particularly the departments concerned with family planning or reproductive health services. This contact is crucial to get the administration's blessing and permission to conduct the survey. If this exercise is donor-funded, the core team needs to brief the appropriate officers within the country office of the donor organizations.

- Review background information regarding the reproductive health services and practices in the country. This is done by reviewing published documents, policy and position papers, technical reports, professional journals, and the like.

- Design (based on the templates provided), pilot test, and validate all survey instruments to be used. The pilot test is an essential exercise to ensure that the survey instrument will meet the objectives of the survey.

- Prepare a budget for the survey activities by listing all anticipated resources and expenditures for personnel, materials, and other financial outlays.

- Recruit data collectors and supervisors.
- Select survey facilities.
- Recruit regional or provincial teams to provide field support to the data collection teams.

Step 2: Identify Objectives of the Survey

A list of realistic objectives for the survey should be developed and agreed on by the key parties concerned. For example, in the CES field test, the following objectives were identified:

- Compare the actual availability of key drugs, equipment, and medical supplies at different health facilities (i.e., government, mission, and private) and at community pharmacies.
- Assess prevailing treatment practices as reported by personnel working in different settings and compare them with the standard treatment guidelines.
- Document recorded treatment practices for selected reproductive health conditions.
- Assess the extent of involvement of community pharmacy personnel in the provision of reproductive health services.

Identified objectives guide the CES Survey Team's decisions on sampling strategy, on which survey instruments to use, and on which components of the CES Survey to conduct.

Step 3: Adapt Survey Instruments

The standard survey instruments provided with this *Guide* (see Appendix C) need to be modified according to the specific objectives of the CES Survey and the way the reproductive health services are provided in the environment in which the survey will be conducted. Minimally, the coding system for the facility type and facility administration for each form and the type of health care providers to be interviewed in the Health Care Provider Interview should be adapted using locally appropriate terms.

Some explanatory notes about the survey forms follow.

Health Facility Survey

- The purpose of Question 6 is to assess whether the basic infrastructure is present at the health facility. The content of the list should be modified to reflect the appropriate standard for what is a "functional facility" in the local setting, based on the policy, norms, and/or expert opinions.
- The items included in Questions 7–9 should be based on the list of medical equipment that was identified as "essential" for the selected conditions/services, the selected treatment regimens, and the policy regarding the lowest level of care in which these conditions are

treated. The survey form should be modified after the list of required commodities is established in the planning stage or in the initial stage of developing the CES Model. (See **Step 5** of this Chapter).

- Whether the availability of *all medical equipment items* identified in the CES Model should be checked at the surveyed facility depends on the objectives of the CES Survey. If the purpose of the survey is to conduct a thorough inventory of the medical equipment at health facilities, the list should be comprehensive. On the other hand, if the purpose of the survey is to gain information about the general status of the availability of the equipment, the list can be shortened with only key "tracer items" selected by the core CES Survey Team. The data collection form should be modified accordingly.

- The inventory check of drugs and medical supplies (Questions 10–15) is based on the same concept as the one for medical equipment. The commodity items to be listed here should be determined by the treatment regimens selected as the norm for developing the CES Model. If multiple strengths or formulations for one drug are listed in the CES Model, choose one of them as the tracer item for the survey.

- The number of drug and supply items included in the inventory check in the survey should be determined by the objectives of the survey. A physical count of drugs could be very time-consuming, especially at large facilities. The number of items for the inventory check should be decided based on the resources (time and financial) available for the data collection. The pilot test will help you decide what constitutes a reasonable list of tracer items. The same considerations apply to Question 16.

Pharmacy Survey

- Drug items for the inventory check should correspond with those items that are listed in the inventory check in the Health Facility Survey, so that the availability of the same drugs at health facilities and at pharmacies can be compared.

- Selection of supply items for the inventory check should be based on the interviews held prior to the survey, with local pharmacy owners, nurses, and other health care providers who know what items that women are typically asked to bring to health facilities for the reproductive health conditions that are to be examined by the survey.

Pharmacy Simulated Purchase Survey

- Because simulated purchase surveys require anonymous data collectors, this part of the survey may be difficult to conduct in a rural setting where it is unlikely that a strange woman would come to a community pharmacy with concerns related to her pregnancy. For this reason, the simulated purchase survey was conducted only in the capital city during the field test.

- Consult local pharmacists and nurses to see if the scenario makes sense in the local setting, including the way symptoms are described and terms are used by simulated purchasers, and what might be anticipated as responses or questions from the pharmacists and pharmacy attendants. Modify the scenario and the form accordingly.

- If actual purchase of recommended drugs poses problems for the survey organizer, the scenario can be modified so that simulated purchasers tell pharmacy staff that they do not have enough money at present, but would like to know their recommendations.

Step 4: Validate Survey Instruments

After the instruments are revised, they have to be validated. The first level of validation involves a review by a panel of experts. Their job is to provide an unbiased critique of the survey instruments regarding their validity and reliability. The expert panel may be made up of the CES team members and some external experts. In many cases, the validation process results in substantial revisions to or reconstruction of the data collection instruments.

At the second level of validation, the revised survey instruments should be pilot tested at one or two types of health care settings that are similar to those where the survey will take place. It is essential to conduct a pilot test to examine whether the survey questions are appropriately formulated to obtain the intended information.

The pilot test of the survey instruments is essential to the process. Some extraneous but critical factors often assume importance in the actual data collection process, including lack of records or records in poor condition, staff refusal to cooperate or disclose information, and unexpected bureaucratic complications. The CES Survey Team must discuss the experiences and observations from the pilot test and reflect these factors in the final revisions of the survey instruments.

Step 5: Select Data Collection Sites

This step is necessary when the target population contains too many facilities to be able to survey every one. It is not necessary to undertake this step if the CES is being used for a single facility or for an area, say a district, with a manageable number of facilities that can all be visited.

Objectives of the Sampling Process

The goal of the sampling process is to collect enough data in terms of the actual number and variety of health facilities for the results to be considered representative of current reproductive health commodity availability and its use within a country. This aspect of the planning process is very important and deserves careful consideration by the CES Team. Failure to ensure that the data set collected is a large enough and varied enough sample could seriously limit the utility of the data analysis and conclusions because the findings will not be generally representative of the country's situation.

The approach for the survey design proposed in this *Guide* is based on the objectives of the CES Survey and its characteristics:

- The purpose of the CES Survey is to document actual availability and use of reproductive health commodities and so identify areas that may be hindering the provision of quality services and hence indicate possible appropriate follow-up activities.

- The survey design is cross-sectional to establish the baseline for monitoring future interventions.

- The survey design is not intended to compare regions, districts, or facilities within the country, but rather to describe a reasonably representative reproductive health commodity management profile for the sample as a whole.

- The survey design is intended to facilitate the logistics so the data collection effort can be accomplished within a reasonably short time (one day per facility) and with limited financial resources.

Selection Tasks

Task 1: Selection of Sample Districts

Important variations often exist within a commodity supply and management system, and those differences may affect the availability and use of essential reproductive health commodities. Some features of the system vary from region to region, facility to facility, and from prescriber to prescriber.

It is important to include facilities representing all significant variations of the overall system in the survey sample. One way to do this is to choose four geographic areas (i.e., districts or regions) in which to work, based on an informed division of the country into groupings determined by such variables as geography, socioeconomic factors, population density, and key features of the health care system. Some criteria for selecting four areas in a country follow:

- The capital city and the main population center (if different) should always be included as one or two of the survey areas.

- If the country is relatively homogeneous geographically and epidemiologically, simply choose the capital city and three other regions or districts at random.

- If the CES Survey Team expects that varying conditions in different areas of the country may influence the way reproductive health commodities are managed, first organize all regions or districts into groups, based on these characteristics, then select the capital city and three study areas at random from these groups.

The following examples and Box 5 show how geographic considerations may be used to develop a sample that is representative of the country:

Example 1: (1) Capital city, (2) Highland agricultural district, (3) Lowland agricultural district, and (4) Arid district

Example 2: (1 and 2) Capital city and one other densely settled urban area and (3 and 4) Two rural agricultural districts

Example 3: (1) Capital city, (2 and 3) Two rural districts with reasonably good transportation links, and (4) One relatively inaccessible rural district

Box 5.
Sampling in the CES Field Test

Alternatively, geographic regions may be divided into groups by the probability of good services. For example, in the first field test, 16 districts from three study provinces were categorized into the following three groups:

- Three districts with *high probability of good service* (i.e., districts with a provincial hospital)
- Five districts with *low probability of good service* (i.e., relatively remote and poor districts)
- Eight districts with medium probability of good service

Finally, the capital city plus one district from the first and second categories and two districts from the third category were randomly selected for the field test.

Task 2: Selection of Sample Facilities

The sample size used in this *Guide* is 20 health facilities: 5 from each of the four selected geographic regions of the country. The rationale for selecting a sample size of 20 health facilities is based on experience, the study design factors, and the following statistical assumptions:

- The design is intended to estimate percentage indicators that summarize values for the whole sample with a 95 percent confidence interval, and plus or minus 7.5 percent error.

- Experience has shown that the results of collecting larger samples are not more useful for identifying the main problems and so do not justify the increased time, cost, and effort.

To make the actual site selections, follow these procedures:

- First, select the district hospital, which should always be one of the facilities selected in each survey district. Select randomly if there is more than one district hospital.

- Then, randomly select four other health facilities from the list of health centers in the selected district. For systems organized with only one basic tier of outpatient facilities below the district hospital (e.g., rural health centers), select the other four as follows:

    If geographic distances and transportation logistics are such that all facilities can be visited and all data can be collected in one day, select four of these second level units at random from the district.

If transportation is more difficult, select two facilities at random, and then choose two other facilities that are geographically close to them, so that the paired facilities may be visited in one trip.

- For a system with two tiers below the district hospital level (e.g., polyclinics, staffed by physicians, and lower level health posts, staffed by paramedics), select the other four facilities as follows:

  Choose two second-level health facilities at random.

  For each of those two second-level facilities, choose one site among the group of third-level facilities that are geographically close. The result is paired sets of second- and third-level facilities.

- For systems that are organized in a still different way, distribute the five facilities to be studied in each district among the possible types of health facilities according to such factors as their geographic location or patient load.

> ✍ **Note:** The most important principles to remember in each phase of this sampling process is *random selection*. The simplest approach to random selection is to apply the interval method to site lists. Make sure that the site lists are complete and organized alphabetically. Select every n^{th} site, where n is determined by dividing the total number of available sites by the desired sample size. For example, if there are 40 sites available, and 4 are needed for the survey, select every tenth site (n = 40 available sites /4 survey sites = 10) on the list.

Task 3: Selection of Patient Encounter Samples for Health Care Practice

Check to identify which reproductive health services are offered at the facility. For all services listed below that are offered, select a *random sample of patients* treated at the facility during the *previous five months*. In addition, select randomly from *current postnatal patients* still in the facility and from *current antenatal care patients*. The exact procedures for selecting cases are described below.

Identify cases from registers and medical records as follows:

For Deliveries, Cesarean Sections, and Cases of Maternal Hemorrhage or Sepsis

1. Identify sample cases using one of the suggested registers of cases (see tables 7 and 8)—the maternity log, the surgical theatre log, or the gynecological or medical ward logs.

2. Search for cases in chronological order, starting with the first patient on or after the cutoff date determined prior to the data collection.

3. Search for a case with the correct condition or diagnosis of interest and, when one is found, list her information on the appropriate Listing Form in the space for Primary Sample Cases. (See Procedures for Studying Health Care Practice in Appendix C.)

4. Search for the next case with the correct condition or diagnosis and list her identifying information on the Listing Form in the space for Alternative Sample Cases.

5. After the initial primary and the initial alternative case have been found, continue listing one primary and one alternative case per week (for deliveries in a hospital), per two weeks (for C-sections or health center deliveries), or per month (for hemorrhage or sepsis cases).

6. This listing is achieved by skipping to the 8th of the month (if listing deliveries in a hospital), the 15th of the month (if listing C-sections or deliveries in a health center), or the beginning of the next month (if listing hemorrhage or sepsis cases) and repeating steps 2–4.

7. If fewer than the target number of cases to be listed (that is, 40, 20, or 10, respectively) were seen for any condition or diagnosis during the five months, simply list all the appropriate cases that were seen during this period.

8. After listing the target number of cases, search for the medical records of the primary sample cases in the department where they are kept at this facility and, for each record found, record the relevant treatment data on the Patient Contact Form.

9. If the medical record for a primary sample case cannot be found, substitute an alternative case, preferably the one seen in the same period as the primary case.

10. Stop recording treatment data after the target number of cases to be recorded has been reached, or when you have searched for all medical records of the listed primary and alternative cases.

11. If no medical records are kept at the facility for a given type of case, simply fill in the listing forms and make a note in the comments section of the Health Facility Survey Form (see Appendix C).

For STI Cases and Urinary Tract Infections (UTIs)

1. Identify cases from diagnoses recorded in the outpatient treatment registers, which, in the case of STIs, may be a special register from the STI Program.

2. Usually data on drugs prescribed are recorded directly in the treatment register, so it is not necessary to list cases but only to transfer treatment data to the Patient Contact Form.

3. Record treatment data for one patient every two weeks for STI patients in any type of health facility and for UTI patients in hospitals, and for one UTI patient per month in health centers.

4. If no data on drugs appear on the treatment register, search for data for the sample cases in prescriptions retained at the pharmacy for this period, using the patient's name, ID number, and date.

5. If neither source of data is available on outpatient treatment, skip these cases and make a note in the comments section of the Health Facility Survey Form.

For Current Postnatal Patients

1. Make a list of names of all mothers currently staying in the health facility who have delivered a baby within the past week, including mothers with complications who may have been admitted to the general medical or surgical wards (see Maternal History in Mothers Interview Form).

2. Select up to five mothers from this list in hospitals or maternity homes and up to three mothers in health centers.

3. If there are fewer than the target number of mothers, select all who are available and make a note in the comments section of the Health Facility Survey Form.

4. Ask to see the ANC cards and medical records of the mothers in the sample, and record the content of their first antenatal visits on the Patient Contact Form.

5. Interview briefly the mothers in the sample, explaining the purpose of the study, and gather the data to complete the Mothers Interview Form.

For Current ANC Patients

1. Visit the MCH clinic of the facility, or the outpatient department (OPD) if MCH services are integrated, to identify mothers who have come for ANC services.

2. Choose at random five mothers who have ANC cards or books with them, explain briefly the purpose of the study, and ask to examine their cards or books.

3. Record the information from their cards or books pertaining to *their first ANC visit only* on the Patient Contact Form.

4. Interview the mothers in the sample and gather the data to complete the Mothers Interview Form, skipping the sections pertaining to labor and delivery.

5. The ANC sample should *always* be completed at a hospital, but if there are too few ANC mothers present at a health center or dispensary on the day of the survey, skip these cases and make a note in the comments section of the Health Facility Survey Form.

Table 7. Guidelines for Selecting Patient Encounter Samples at Facilities Offering Referral Services

IF THE FACILITY IS A HOSPITAL OR MATERNITY HOME OFFERING REFERRAL SERVICES			
RH Problem	**No. to Record**	**No. to List**	**Possible Sources of Patient Records**
RETROSPECTIVE SAMPLE			
Deliveries	20	40	maternity log
Cesarean section	10	20	delivery outcome cards, theatre or maternity logs
Maternal hemorrhage	5	10	gynecology ward or theatre logs
Maternal sepsis	5	10	gynecology or general medicine ward logs
STI (gonorrhea, syphilis, PID)	10	NA	STI program or OPD treatment logs
Urinary tract infections	10	NA	OPD treatment log
CONCURRENT SAMPLE			
Current ANC patients	5	NA	mothers waiting for ANC services
Current deliveries	Up to 5	NA	current postnatal patients

Table 8. Guidelines for Selecting Patient Encounter Samples at Facilities without Referral Services

IF THE FACILITY IS A HEALTH CENTER OR MATERNITY HOME WITHOUT REFERRAL SERVICES			
RH Problem	**No. to Record**	**No. to List**	**Possible Sources of Patient Records**
RETROSPECTIVE SAMPLE			
Deliveries	10	20	maternity log
STI (gonorrhea, syphilis, PID)	10	NA	STI program or OPD treatment logs
Urinary tract infections	5	NA	OPD treatment log
CONCURRENT SAMPLE			
Current ANC patients	5	NA	mothers waiting for ANC services
Current deliveries	Up to 3	NA	current maternity patients

Task 4: Selection of Retail Pharmacy Samples for Pharmacy Survey

The sample size of the retail pharmacy survey is 20, 5 from each of the four geographic regions of the country. In addition to retail pharmacies, there may be other types of retail outlets for drugs and other reproductive health commodities, such as drug stores. It is important to obtain a clear idea of the different types of outlets operating in the country, their relative proportions and geographic distributions, and the regulations that affect what may be sold. The pharmacy survey sample should be selected to include proportional numbers of all major types.

In selecting the drug retail outlet site sample, the simplest approach from the logistical point of view would be to choose the site that is geographically closest to each randomly selected health facility visited. Two problems with this approach are that—

1. Those outlets situated closest to health facilities may not be representative of all outlets.

2. In some settings where rural health facilities are located, there may be no pharmacies or other retail drug outlets.

A better approach from the point of view of representative sampling is random selection within each of the four geographic areas in the sample design. The best way to accomplish this it to apply the systematic interval sampling method to site lists, as described under Task 2: Selection of Sample Facilities.

Step 6: Recruit and Train Data Collectors

Once the survey instruments are finalized, the permission to conduct the survey is granted, and the resources for the survey are committed, the next step is to identify and train dependable and competent data collectors.

Before Actual Recruitment

The CES Survey Team must decide—

- Duration and strategy of data collection
- Overall composition and size of the data collection team
- Number of data collection teams required to accomplish the task
- Financial and logistical requirements for the data collection
- Who will be the survey coordinator

Actual Recruitment

Based on the decisions above, the CES Survey Team recruits the data collectors. The goal is to find individuals who are experienced and competent in the subject matters related to the survey and who are also interested in field work. It is always important to ensure that those individuals are good team players.

Box 6.
Data Collectors for the CES Field Test

- For the CES field test in an African country, four young pharmacists and four senior nurse-midwives who were also trainers were recruited at the central level. Two of the nurse-midwives were members of the CES Survey Team and had also been involved in earlier stages of development and validation of the survey instruments. These eight data collectors formed two teams, with two pharmacists and two nurse-midwives per team.

- While the data collectors were in the field, they were assisted by a provincial public health nurse in each of the four survey provinces. With their knowledge of the local people and health system, the provincial public health nurses provided valuable support to the data collectors by offering basic information about the reproductive health services in the province, helping them find ways to survey facilities, and introducing them to key facility staff.

- The survey coordinator was a local health system research and evaluation specialist with a background in pharmaceutical management.

Training Data Collectors

Experience from the CES field test suggests that five to six days are needed to train data collectors to carry out a full-scale CES Survey at the national level using all seven instruments. Objectives of the training will be best achieved through a curriculum that combines classroom and field exercises.

Major objectives of the data collector training are to—

- Achieve clear and common understanding of the purpose of the survey.

- Learn the meaning of questions and the sources and methods of data collection.

- Become aware of potential problems they may encounter in the field during the data collection.

- Agree on the guidelines for dealing with unanticipated problems and situations during the data collection so that the consistency among data collectors and teams can be maintained, which is the key to a high level of quality in data collected.

Key issues in planning the training are—

- Training venue
- Duration of the training
- Training approaches and methodology
- Training curriculum
- Site(s) for field exercise
- Logistical arrangements (e.g., training materials, meals during the training, transport, allowances)

For a successful training, facilitators should do the following:

- Ensure that data collectors have plenty of opportunities for hands-on experience at actual facilities so that they themselves can identify potential mistakes and problems during the training.

- Create an atmosphere that encourages data collectors to bring up their concerns and questions openly.

- Provide adequate information and explanations to questions and concerns expressed.

- Make sure that everyone has agreed on a common approach to solving problems and knows why it is important.

- Provide consistent information. The worst scenario will be when data collectors are left with conflicting or ambiguous information.

A sample plan for the CES Survey data collector training, used in the field test, appears in Table 9.

Table 9. Data Collector Training Schedule

Day & Objectives	Time	Topic & Activity	Venue
Monday **Objective:** To gain an overview of the CES Survey and the basic concepts of survey data collection	8:30–9:00 9:00–9:30 9:30–10:30 10:30–11:00 11:00–1:00 1:00–2:00 2:00–4:30 4:30–5:00	Opening of the training week Participant introductions and overview of the training plan Introduction to the CES and the survey objectives TEA BREAK Data collection basics LUNCH BREAK Detailed review of CES Survey instruments to understand the content and instructions Process review and feedback “How well are we getting on?”	Classroom
Tuesday **Objectives:** To gain in-depth understanding of operational and logistical issues for data collection To begin preparations for the supervised field exercise	8:30–10:30 10:30–11:00 11:00–1:00 1:00–2:00 2:00–4:30 4:30–5:00	Detailed review of CES instruments (continued) TEA BREAK Tips on collecting valid and reliable data LUNCH BREAK Preparing for a field test of the data collection instruments: the process, issues, concerns, and logistics Process review and feedback “How well are we getting on?”	Classroom

Table 9. Data Collector Training Schedule (cont'd.)

Day & Objectives	Time	Topic & Activity	Venue
Wednesday **Objectives:** To gain hands-on experience of the data collection process under the supervision of the coordinator To prepare for the trial data collection as a team	9:30–4:00 4:00–5:00 5:00–6:00	Data collection demonstration by the survey coordinator Entire data collection team works side by side with the survey coordinator at the selected health care facility. Process review and feedback What was learned in the field? Any anxieties? Surprises? Concerns? Threats to data validity? "How well are we getting on?" Data collectors divide themselves into two teams of four members each. Each team chooses a leader. Each team ensures the following are in place and ready for trial-run data collection for the following day: - Enough copies of questionnaires - A vehicle and driver - Money for gas and allowances - Facility to be visited notified *It is crucial for the group to prepare a checklist for its requirements and discuss it with the survey coordinator.*	District level hospital Classroom

Table 9. Data Collector Training Schedule (cont'd.)

Day & Objectives	Time	Topic & Activity	Venue
Thursday **Objectives:** To experience data collection as a team and to identify any issues and concerns for the survey instruments and the data collection plan To begin developing a sense of teamwork among members of each data collection team	8:30–4:00	Trial data collection Two data collection teams go to health facilities and collect data, using the survey forms, without supervision by the coordinator. Each team will be on its own and will be expected to cover one facility during the time given. *Expectations:* Each group will be responsible for planning, carrying out, and completing data collection at the facility.	Trial data collection at facilities
	4:00–6:00	Process review and feedback What was learned in the field? Any anxieties? Surprises? Concerns? Threats to data validity? Were survey instruments clear and operational? Was time adequate to finish the task? Are there any revision/modifications needed for the survey instruments? "How well are we getting on?"	Classroom

Table 9. Data Collector Training Schedule (cont'd.)

Day & Objectives	Time	Topic & Activity	Venue
Friday **Objectives:** To finalize survey instruments To address any remaining issues and concerns To prepare for the data collection trip	8:30–1:00 1:00–2:00 2:00–6:00	Final revision of instruments Based on field experiences, the study instruments are revised/modified and a consensus reached on the final drafts of the study instruments. All the key field observations and concerns are taken into account before the final version is released. LUNCH BREAK Getting ready for the data collection trip Production of enough questionnaires to cover the data collection period. House-keeping activities (logistics, per diems, data collection strategies, routing/mapping, field contacts, tips, contingency/emergency procedures, etc.) in readiness for upcoming data collection trip	Classroom

Step 7: Make Logistical Arrangements

After instruments are developed and field tested and the data collectors are trained, actual data collection is almost ready to begin. However, it is crucial for the data collectors to spend *at least a full day planning and getting ready* with all the resources they need.

As part of their field preparations, the data collectors must ensure that they have the following:

1. Items and resources they will need in the field, including—
- Research support materials (e.g., stationery, receipt book, expense forms, travel log)
- Adequate finances
- Enough copies of survey forms
- Dependable project-type vehicle (typically, a four-wheel drive)
- All the necessary official authorizations
- Communication equipment, if required

2. A clear strategy for how to achieve their targets, including—
- How many sites will be visited by each data collection team
- The number of weeks required for the data collection exercise
- Which sites will be visited when

Box 7.
Mapping the Data Collection Plan

In developing a data collection strategy, it is useful to create a *data collection map* for the given locale (e.g., district). The map can show data collectors—

- Location of sample facilities
- Possible routes between facilities
- Estimated travel time
- When and by whom the facilities should be visited

By visualizing the data collection schedule, the mapping exercise helps data collection teams develop a realistic plan.

As soon as the data collection plan is developed, sample facilities should be notified of the visit by the data collection team. When sample facilities were selected, a contact person for each sample facility should have been identified—for example, the hospital manager, chief finance officer, chief nursing officer, chief pharmacist, and/or health information officer. In addition, if data collectors plan to have a briefing meeting with key staff at the facility, a request should be made in advance for such a meeting.

Note: In the CES field test, it took two data collection teams three weeks to gather data from a total of 47 health facilities (15 hospitals, 29 health centers, and 3 maternity homes) in five districts in three provinces. Also included were data from 39 community pharmacies in the selected districts and simulated client surveys at 74 community pharmacies in the capital city.

Conducting the Survey

Data Collection at Health Facilities

Before starting data collection at a facility, each team should decide how it wants to organize the time available at the facility. There are five data collection forms to be completed at each facility and one with two parts at each pharmacy.

- Health Facility Survey (HFS) Form
- Health Care Practice Form (HCP)
- Patient Contact Form (PCF)
- Health Care Provider Interview (HCPI)
- Mothers Interview (MI) Form

First at the sample facility, the data collection team should hold an introductory meeting with the key members of the hospital staff (e.g., medical superintendent, hospital matron, chief supply officer, chief pharmacist) or with the medical and nursing officers in charge of a lower level facility. At this briefing, explain the purpose of the survey and assure the staff that *its purpose is not to rate their facility*.

Detailed instructions for collecting data are provided on each form. Additional information about how to organize the data collection activities at the facility are given below.

Health Facility Survey Form

- After completing the staff briefing, explain that the team would like to ask some general questions about the reproductive health services offered, recent utilization, infrastructure and equipment, and inventory of commodities.

- The HFS form consists of three sections: service, infrastructure and equipment, and inventory of commodities. For efficient use of time at larger facilities (e.g., provincial hospital), the team may decide to split into smaller groups and work with different sections of the form simultaneously.

> **Note:** If the data collection team includes people who are familiar with medical equipment (e.g., nurse) and people who are more familiar with pharmaceuticals (e.g., pharmacist or pharmacy technician), the team may split into two groups according to their expertise to work on the sections of the Health Facility Survey form that they are more familiar with.

- Stock level of drugs is examined in two ways: physical inspection of the current stock level at the time of the survey and the retrospective review of the stock level in the six-month period prior to the survey. The intention is to capture any fluctuation in the stock level at the facility due to seasonal changes in the demand for service, drug supply cycle, and other factors that affect the stock level. Be sure to distinguish when stock-out is zero and when stock-out data are not available.

- Any additional information that data collectors gather from health care providers or health information officers should be recorded in the comment section at the end of the form.

Procedures for Studying Health Care Practice and Patient Contact Form

- This part of data collection benefits from having data collectors with expertise in both nursing/midwifery and pharmacy: nurses/midwives are familiar with laboratory tests and other procedures in the records, and pharmacists know about information on drug treatment. Whenever possible, it is recommended to pair up data collectors with these backgrounds.

- First, data collectors have to find out what types of reproductive health conditions are treated at the sample facility. Using the tables contained in the "Procedures for Studying Health Care Practice" in Appendix C, identify types of reproductive health conditions and the number of cases whose names should be listed as *primary* and *alternative samples*.

- Next, data collectors need to find out how and where the patient information is recorded for each type of target condition at the facility. The team can start the inquiry at the first briefing meeting with key staff and follow up with more detailed discussions with the health information officer or a nurse who actually handles the records. In order to obtain all the necessary pieces of information, data collectors may have to use multiple sources.

- When data collectors are actually entering the treatment information from medical records into the Patient Contact survey form, it is helpful if nurse(s) from the maternity ward can help read the records and explain record keeping practices at the facility.

Health Care Provider Interview

- It is important to ensure that health care providers understand that the purpose of the survey is *not* to hear "correct" answers, but to learn what each care provider actually did for the last case he or she attended. DO NOT provide any information or reaction to the respondent that may be perceived as judgmental or may lead responses in a particular direction.

- The survey is intended as a face-to-face interview with one person at a time; it is *not* a self-administered questionnaire. DO NOT distribute it to health care providers in advance or give them any prior information about the specific content of the interview.

> **Note:** Data collectors in the field test found it easy to prevent curious respondents from looking at the survey form from the side if they sat face-to-face with them during the interview.

- The medicines and tests listed on the survey form are only to help data collectors record the response; they should NOT BE READ OUT to the respondent.

- If respondents give too general information about other drugs or tests, probe further for clarification. Make sure that data collectors only enter the information about drugs, vaccines, and laboratory tests. Do not write in the "Code" sections during the data collection. These sections are for data entry.

Mothers Interview Form

- In order to gain the confidence of the women who are to be approached, data collectors may want to request health care providers at the facility (e.g., nurse/midwife) to introduce them.

Data Collection at Private Pharmacies

Pharmacy Simulated Purchase Survey Form

- If the same pharmacies are selected for both the face-to-face Pharmacy Survey and the Simulated Purchase Survey, the simulated purchaser should be different from the surveyor for the face-to-face Survey.

- The surveyors should keep the scenario consistent in their conversations with pharmacists and pharmacy attendants at all pharmacies they visit.

✍ **Note:** It is important to instruct data collectors to write legibly with a pen (not pencil) and to use marks or phrases that indicate a complete thought or response when filling out the data collection forms. This may mean using a check mark, writing "yes" or "no," circling a response, or writing a phrase or sentence to explain a particular finding. This is important because the person completing the form may not be the same person who will enter the data or tabulate the results.

Box 8.
Tips for Managing the Data Collection Team

- The groups should always have a daily process review meeting in the evening to share experiences and provide feedback on the day's proceedings.

- The group should review the data to check for completeness as soon as possible while the memories are fresh.

- The data collection coordinator should provide ongoing support and supervision and offer overall technical guidance while the data collection teams are in the field. It is ideal if the coordinator can make a supervisory visit to the field at an early stage of the data collection period to address any problems that arise.

- Each data collection team leader should make sure that targets are being achieved and that the group holds together. The team leaders must brief the coordinator at least every other day. Arrangements for the communication between the field and the coordinator should be established before the data collectors go to the field.

- The team leaders should hand in data to the coordinator after every week to minimize risk of loss, physical deterioration, or any mishap.

- Key question in the field is, "Where are we on the expected targets, logistic preparedness, finance, survey materials, and morale?"

Handing Over the Data

Once the data have been collected, the data collector teams and the survey coordinator should meet again to officially hand over the data. During the handing over, each team goes through the completed tools with the coordinator to ensure that all the necessary information and all the forms are accurately filled in and correctly labeled.

If the data are going to be analyzed by different teams that are geographically dispersed, make back-up copies of raw data in case of loss or deterioration of data during transit.

Entering the Data

Clean the Data

During the Data Collection Trip

The first level of cleaning the data takes place during the daily team meeting (see Box 8) when the day's experience and concerns are shared among team members.

- Discussion among the team may result in some decisions about how to treat new situations or ambiguous data. *The team leader should keep records of issues made and decisions discussed* by the team during the data collection trip. The team leader should also discuss these issues with the survey coordinator during the regular communication from the field.

- It is also important to keep explanatory notes on the survey forms whenever the situation was not straightforward and some kinds of decisions were made on the spot or at the team meeting. These notes will remind data collectors of the nature of the issues so that they can explain their problems and respond to the survey coordinator's questions.

After the Data Collection

The second level of data cleaning is the survey coordinator's responsibility. Organizing a debriefing meeting with all the data collectors is a useful way to begin the process.

- After reviewing the completed survey forms handed in by the data collectors, the coordinator should develop a list of questions to ask the data collectors. At the meeting with the data collectors, the coordinator should go over each type of survey form, section by section, and raise the questions and concerns identified in the review. Discussion may highlight different approaches taken in similar situations by each data collection team.

- The debriefing meeting also helps the survey coordinator understand the context in which the data collection took place. If additional clarifications are required from individual data collectors, the coordinator should ask for an explanation as soon as possible while the collector's memory is fresh.

- The coordinator should keep a good record of all the information obtained through this process.

Quality Control

Keep records of decisions that are made during the data entry, so that consistency in the decision making can be maintained throughout the data entry process. These records also enable the survey coordinator to go back to individual entries and change them *if different decisions are made afterward*.

In addition, any decisions that are made during the data entry process should be immediately and clearly communicated to all persons who are entering the data.

Analyzing the Data

If the data collection exercise employed all seven survey instruments provided with this *Guide*, a large amount of data about the reproductive health services and commodity management will have been assembled. It is easy to get lost at the data analysis stage without clearly thought-out objectives and strategy.

The main objectives and the scope of the survey, which were defined at the planning stage, should be the guide for planning the data analysis process. Start with a limited scope of analysis at the first stage, examine the results, and arrange for the CES team to review and discuss them. After that, the CES team may want to move to a second stage of analysis and look more in depth at particular aspects of observations or at the problems that emerged from the initial analysis.

The survey is likely to have assembled a voluminous amount of information. It is possible to calculate results from the CES Survey data manually, though this is often time-consuming. Large amounts of data are best analyzed by recording the information in an electronic format that can be rapidly manipulated by a software application, such as a spreadsheet or database program or a statistical package (e.g., Epi Info), to generate useful statistics and summary results.

With the use of any of these applications, it is invaluable to invest in a mechanism to verify the accuracy of the data input. One way is to obtain a printout of all the entered data, by site and survey instrument, and compare this closely with the original, completed data collection forms. Look for entries that do not fall within expected values and investigate.

Calculate and Interpret Survey Results

Depending upon the scope of the survey and the range of instruments used, the CES Survey can provide information on each individual aspect or all three aspects of reproductive health commodity management—service and commodity availability, use of reproductive health commodities, and local cost of commodities.

With the CES Survey, you have collected information on the reproductive health commodity management at a point in time. If it is desired to review changes over a period of time, it will be necessary to repeat the exercise for selected instruments or for particular components or questions in specific instruments at intervals. Review of information in such a time series can indicate whether improvements are occurring in the situation

Commonly, the data is used to compute the frequency, level, or extent of a characteristic of reproductive health commodity management, and, as appropriate, compare the surveyed or "actual" situation against a "standard." For example, you may wish to determine the number and percentage of the sample of facilities that have a set of tracer drugs available to dispense, or you may want to calculate the average number of months a woman has been pregnant at the time of her first antenatal care visit and compare these results to the "ideal" situation.

Table 10 illustrates a number of examples of useful statistics that summarize the survey data. Many other statistics, or variations to these, can also be derived from the data collected. The summary statistics can be used to present the main findings to key stakeholders and to initiate actions to address the problems identified by the data. Examples are shown that relate to the three key aspects of the CES Survey—

- Service and commodity availability
- Use of commodities
- Local cost of reproductive health commodities

Select the statistics, or develop alternative statistics, that the CES team considers useful in summarizing the information that addresses the main survey questions.

If the objectives of the survey include comparing findings by sector, level of care, type of health care provider, individual health care provider, or any other characteristics of the unit of data, it will be necessary to calculate a set of statistics for each subgroup of the population of interest.

It is also useful and meaningful to compare related statistics. For example, compare the results of the analysis of data on the use of commodities (which indicate adherence by health care providers to the standard treatment guidelines) with statistics on the availability of required commodities. Relationships may be observed—for example, infrequent prescribing of a particular drug by health care providers may correspond to high average days out of stock for that drug. Box 9 illustrates a further example.

Box 9.
What Can the Results Reveal? An Example

The results can raise questions to be discussed by the CES team and with key stakeholders.

For example, what can be the possible explanations for the high stock level of folic acid and iron tablets *and* the infrequent prescribing of these nutritional supplements by health care providers to pregnant women receiving antenatal care?

After discussing the findings at a policy workshop after the CES field test, a decision was made by the Provincial Reproductive Health Coordinator to educate health care providers about the importance of prophylactic use of folic acid and iron supplements during pregnancy.

Table 10. Examples of Statistics That May Be Derived from CES Survey Data

Summary Statistic	Computation	Interpretation	Survey Instrument
Service and Commodity Availability			
Number and percentage of facilities in sample that provide each type of service.	Calculate for each type of service (e.g., antenatal care, treatment of STIs): Number of facilities providing the service x 100 Total # of facilities in the sample	Ideally, all (100%) facilities should be providing the type(s) of reproductive health services according to the policy.	Health Facility Survey Form
Percentage of services reported received at the first antenatal care (ANC) visit, by interviewed mothers, that are compliant with STGs.	For each service (e.g., tests, vaccination, iron supplement) recommended by the STGs: Total # of respondents reporting having received the drug or the test x 100 Total # of women interviewed	Ideally, all (100%) pregnant women receiving antenatal care should receive all types of services that should be provided according to STGs. Comparing the statistic for each type of service with statistics on the availability of commodities required to implement the services may indicate possible reasons for low utilization.	Mothers Interview Form
Percentage of facilities that have at least one working refrigerator.	Number of facilities with working refrigerator x 100 Total # of facilities surveyed	Ideally, all (100%) facilities should have a working refrigerator. Low percentages indicate that there could be problems in maintaining the quality of stocks of drugs.	Health Facility Survey Form

Table 10. Examples of Statistics That May Be Derived from CES Survey Data (cont'd.)

Summary Statistic	Computation	Interpretation	Survey Instrument
Service and Commodity Availability			
Percentage of facilities that have each tracer drug	Calculate for each tracer drug: Total # of facilities with (unexpired) stock x 100 Total # of facilities in sample	Ideally all (100%) of the tracer commodities should be available all of the time. *Note*: This result only provides a snapshot of the availability of commodities at the time of the survey. It is also limited in describing whether the facility has enough of the commodity in stock. A variation of the result can be obtained by setting minimum stock levels and counting only facilities that have stock on hand larger than the minimum level.	Health Facility Survey Form
Average stock-out days per month	For a single facility: For each tracer drug calculate Total # of days out of stock during the period under review Total # of months under review All facilities: For each tracer drug calculate Sum of average stock-out days per month for each facility Total # of facilities in sample	The target of this statistic should be 0, i.e., no stock-outs. This result helps to show if the availability is constant over time.	Health Facility Survey Form

Table 10. Examples of Statistics That May Be Derived from CES Survey Data (cont'd.)

Summary Statistic	Computation	Interpretation	Survey Instrument
Service and Commodity Availability			
Percentage of tracer drugs missing (This can be replicated for medical supplies and equipment.)	*Example 1:* Drugs at each facility: Total # of tracer drugs not available at facility x 100 Total # of tracer drugs that should be at facility *Example 2:* Drugs at all facilities: Sum of % for each facility Total # of facilities in sample	Ideally the percentage derived should be 0% for all types of commodities, that is, there should be no missing tracer commodities. A comparison of the statistic between facilities is useful in monitoring the level of availability and identifying where serious problems exist. *Note:* This result only provides a snapshot of the availability of commodities at the time of the survey.	Health Facility Survey Form
Median stock level of key tracer commodities (*Median* is the number in the middle of a set of numbers; that is, half of the numbers have values that are greater than the median, and half have values that are less.)	• List all data for the stock level for each commodity item at the facilities, starting from the lowest to the highest figures; include facilities with the same figures. • Find the stock level figure that is in the middle of the array of figures. • If the number of facilities is even, then the median is the average of the two figures in the middle. *Note:* Median is used, instead of the average, to avoid the possibly strong influence of an extremely low or an extremely high stock level that may be observed at one or two facilities.	The result is particularly useful when compared with the minimum standards that are set, for example, for type of facility, the level of care, or the volume of services provided at facilities. This comparison will show whether facilities are maintaining appropriate levels of stock.	Health Facility Survey Form

Table 10. Examples of Statistics That May Be Derived from CES Survey Data (cont'd.)

Summary Statistic	Computation	Interpretation	Survey Instrument
Service and Commodity Availability			
Percentage of practices, *reported* by health care providers, that are compliant with the standard treatment guidelines (STGs)	Select key drugs or tests included in the STGs as the recommended treatment of a target condition. For each drug or test: Total # of respondents reported the use of the drug or the test x 100 Total # of health care providers interviewed	This percentage obtained gives an indication of the knowledge of health care providers about the STGs. A low percentage suggests the need for increased training in the implementation of the STGs. *Note:* The result does not represent actual practice patterns.	Health Care Providers Interview
Percentage of health care providers' *actual* practices that are compliant with the STGs	Select key drugs or tests included in the STGs as the recommended treatment of a target condition. For each drug or test: Number of encounters with recorded use of the drug or the test for target conditions x 100 Total # of encounters with diagnosis of the target condition	This result measures adherence to the STGs. High percentages suggest positive behavior that should be reinforced or encouraged. Low percentages identify the need for improvement. *Note:* If routine practices or commodities brought by patients are not always recorded, the accuracy of the result decreases.	Health Care Practice Form
Average months of pregnancy at the first antenatal care (ANC) visit	Sum of months of the first ANC visit by the interviewed mothers Total # of mothers interviewed at the facility	This result would show whether pregnant women were seeking antenatal care in accordance with policy or international guidelines. (WHO recommends the first antenatal care visit be made by the end of the fourth month.)	Mothers Interview Form

Table 10. Examples of Statistics That May Be Derived from CES Survey Data (cont'd.)

Summary Statistic	Computation	Interpretation	Survey Instrument
Service and Commodity Availability			
Percentage of pregnant women who brought commodities to the facility for their delivery	Each commodity item: Number of postnatal women who reported bringing the item to the facility for her delivery / Total # of postnatal women interviewed who delivered at the facility x 100	In a country situation where public health services are supposed to be free, the result should be 0% because all the necessary commodities should be available at the facility, and thus there should not be a need for pregnant women to purchase and bring any commodity to the facility. A comparison of the percentages for different items can identify which commodity is more likely to be missing at the facility.	Mothers Interview Form
Local Cost of Reproductive Health Commodities			
Median purchase price of commodities by facility	Median of last purchase price for each commodity reported by facilities surveyed.	The lower the purchase prices paid by the facility for local procurement, the better (providing quality is not compromised). A comparison of the results with the prices paid by mothers and centrally purchased prices will be useful.	Health Facility Survey Form
Average total out-of-pocket spending by pregnant women for purchasing commodities for their deliveries	Sum of out-of-pocket spending reported by mothers interviewed / Total # of mothers interviewed x 100	Ideally, depending upon the country situation, the result should be zero or very minimal, as there should not be any out-of-pocket spending for commodities outside the facility by pregnant women due to the lack of essential commodities.	Mothers Interview Form

Table 10. Examples of Statistics That May Be Derived from CES Survey Data (cont'd.)

Summary Statistic	Computation	Interpretation	Survey Instrument
Local Cost of Reproductive Health Commodities			
Average cost of items bought by pregnant women for their deliveries	Each type of commodity item (e.g., gloves, cotton wool): Sum of price paid by mothers interviewed Total # of mothers reported purchasing the item	Compare the price paid by mothers with the facility purchased price and the centrally purchased price, and determine the additional cost borne by pregnant women because of the lack of essential commodities at facilities.	Mothers Interview Form
Percentage of pharmacy staff recommending iron folate to pregnant customers	# of pharmacy staff interviewed recommending iron folate x 100 Total # of pharmacy staff Interviewed	A low percentage would suggest that pharmacy staff were less knowledgeable about appropriate products to recommend to pregnant women.	Pharmacy Survey Form

CHAPTER 8. USING THE CES FOR DECISION MAKING

When data from the CES Model and the Survey are combined and compared, they can present useful information about multiple aspects of reproductive health commodity management. The data can trigger in-depth discussion among key stakeholders with different expertise and responsibilities.

The first part of this chapter presents brief descriptions on how to organize and conduct a workshop using the data generated by the CES activities. The second part provides five examples of how policy makers and program managers could systematically approach some of the key planning and management questions and decisions in reproductive health service provision using the CES tools.

Plan and Conduct a CES Workshop

The workshop is an excellent opportunity to disseminate the findings from the CES activities, identify where gaps in commodity management for reproductive health services exist, and identify steps to address problems with key stakeholders, including policy makers at the national level, program managers and health care providers at the local level, supply managers at various level of the supply system, and the donor community.

Prepare for the Workshop

Step 1: Identify Key Issues

As the CES Team starts preparing for the workshop, it is important that the team members carefully review the findings from the CES Model and Survey and discuss among themselves the issues that these findings illustrate. It may be useful to divide team members by their expertise into a few groups and present the results to the rest of the team.

After the presentation, have the team discuss—

- What are the key issues that workshop participants should discuss after the presentation?
- What are the potential follow-on activities that the workshop can identify?
- Which findings will most effectively prompt such discussion?
- How can these main discussion points be categorized?

Potential discussion points may include the following issues.

Policy Issues

- Treatment guidelines

  Do the current standard treatment guidelines provide appropriate, clear, and updated information to health care providers at every level?

  Does the current commodity supply system provide the health facilities with commodity items that are necessary to implement the standard treatment guidelines?

Are the standard treatment guidelines accepted and used by health care providers? If not, why? How are they developed and promoted?

- Appropriate level of care and support needs for health care providers

  Are there any inconsistencies between the standard treatment guidelines, training curriculum, commodity supply system, and the policy regarding the care to be provided?

  Does the policy reflect what is actually happening in the field? Are any health care personnel faced with conditions where they have to provide care without adequate training?

Availability of Commodities

- Are essential commodity items available at facilities? Is there any oversupply of certain commodities? Is there any mechanism to adjust the gaps between facilities?
- How does the observed lack of commodities affect the quality of care for patients as well as for health care providers (e.g., infection control)?
- Is the lack of commodities at the lower level of facilities (e.g., health centers) contributing negatively to the low utilization of those facilities and overcrowding of hospitals?
- Are there different streams of commodity supply managed by disease-specific vertical programs? What are the implications for the availability and use of key reproductive health commodities at the facility level?
- Are health care providers receiving adequate training and support to use medical equipment at their facilities?

Knowledge and Practice of Health Care Providers

- Are there any patterns observed among health care professionals' knowledge about the treatment of reproductive health conditions?
- Where are the gaps between standard treatment guidelines and knowledge or treatment practice observed?
- Is there any correlation between the reported/observed practices and the availability patterns of essential commodities?

Pregnant and Postnatal Women's Perspectives

- How do the types of services received at the first antenatal care visit reported by women differ from standard treatment guidelines? How do they differ from what was reported by health care providers in the interview? How do they differ from what was observed in the medical records?

- How much are women paying as out-of-pocket expenses for essential commodities for reproductive health services at health facilities compared with costs for the same items when they are purchased through the supply system in bulk?

- How can facilities improve the availability of essential commodities and/or reduce the financial burden borne by women who receive reproductive health services at facilities?

Step 2: Develop an Agenda

A list of discussion points, categorized into a few areas after discussion by the CES Team as described above, can become the basis for developing an agenda or schedule for the workshop. The workshop schedule can be divided into four segments:

- Descriptions of CES tools and activities
- Presentations of major findings from the CES activities
- Discussion of issues identified
- Development of next steps

It is important to keep the balance between these segments. A sample agenda for a workshop where the majority of participants are not familiar with the CES tools appears in Table 11. If only a small minority of workshop participants are not conversant with the CES methodology and tools—because most had been involved in the CES Team, for example—then less time may be allocated to the Overview and descriptions of the Models and Survey.

Table 11. Sample Agenda for a CES Workshop

DAY 1	
8:30–9:00	Welcoming remarks Opening of the workshop
9:00–9:15	Objectives of the workshop
9:15–10:00	Overview of the Cost-Estimate Strategy
10:00–10:15	Tea break
10:15–11:15	RH services and standard treatment guidelines
11:15–1:00	CES Model
1:00–2:00	Lunch
2:00–3:00	Methods of CES Survey
3:00–3:15	Tea break
3:15–4:30	Presentation of the CES Survey data Part 1: Availability of essential RH drugs and supplies
4:30–5:30	Discussion of Day 1

Table 11. Sample Agenda for a CES Workshop (cont'd.)

DAY 2	
8:30–9:00	Recap of the first day's discussion Presentation of the CES Survey data (continued)
9:00–9:30	Part 2: Availability of essential RH equipment
9:30–10:00	Part 3: Knowledge and practice by health care providers
10:00–10:15	Tea break
10:15–10:45	Part 4: Mothers' perspective
10:45–1:00	Discussion of the survey data
1:00–2:00	Lunch
2:00–4:00	Small group discussion of issues and next steps (See Box 10.)
3:00–3:15	Tea break
4:00–4:30	Reports from the small group discussions
4:30–4:45	Summary of discussion
4:45–5:00	Closing remarks

Box 10.
Illustrative Small Group Discussion Guide

Small group discussion may be a useful format to encourage in-depth discussion among people with specific expertise. At the end of Day 1, the CES Team and other workshop facilitators can review the main issues raised during the day's discussion and identify three to five topics that are suitable to the objectives of the workshop and the type of expertise among the participants. A facilitator should be assigned to each small group, and a discussion guide should be developed. An example of such a discussion guide, used at a national level workshop, follows (and is based on the completed CES exercise having had a *national* focus).

Each group should describe
1. Action points or next steps
2. Training implications for the action point/next step
3. Stakeholders to involve for the action point/next step

Group 1: Implementation of CES at the Lower Administrative Levels

- What would it take to use CES at the province or district level?
  - Which part of the CES tools would be most useful?
  - How can they be adapted so that they can be operational and useful?
  - How would they be implemented?
  - Who should be involved from the national level? From the provincial or district level?

Group 2: Treatment Guidelines

- What are the gaps in the availability of services for the reproductive needs of women?
- What are the guidelines available in the country for the different levels?
- What are the strengths and weaknesses of the current guideline(s) to meet the needs?
- What needs to be done to make them up-to-date, consistent, and relevant?
- What drugs, supplies, and equipment are needed to make the guidelines operational at each level?

Group 3: Cost Estimation and Financing

- How can adherence with the current STGs be improved in terms of—
  - Essential drugs, supplies, and equipment needed
  - Cost estimates for the essential commodities
  - Estimate of the number of cases (epidemiological data)
- What are the various ways to finance reproductive health commodities?
- How can CES assist in determining the strategy for cost-sharing?

Group 4: Availability and Supply Issues

- What are the supply system issues that need to be considered with health sector reform and decentralization?
- What are the best ways to procure and supply essential commodities in view of the—
  - Current system
  - Commodities supplied within vertical programs (e.g., STI, family planning)?
- How can the central level procurement and supply agencies support district and provincial levels for potential decentralization of commodity procurement?

Examples of Using CES Data for Planning and Management Decisions

1. Evaluating the Commodity Cost Implications of Treatment Guidelines

Task	Identify treatments of choice for reproductive health conditions.
Who Needs to Know	Reproductive health program managers Pharmaceutical and therapeutic committees
What to Ask	How much does a treatment regimen cost for drugs and supplies? What are the commodity costs of adding procedures or tests to the treatment protocol?
Application of CES	**Task 1**—Prepare a Country-Specific Model for the reproductive health conditions of interest based on the national standard treatment guidelines, nursing school curriculum, observation at a district hospital, and central medical store price lists. **Task 2**—Evaluate the effect of different treatment options on the episodic drug and medical supply costs in the CES Model. For example, use the Model to assess whether a treatment cost will increase significantly if a particular laboratory test is added to the guidelines or a different laboratory test agent is introduced. **Task 3**—Assess—using the CES Survey—the availability of key medical equipment necessary to implement treatment recommendations at lower level facilities. Estimate the additional costs of providing missing equipment for the facilities using the CES Model.
Output	• Standard treatment guidelines that are affordable for the system • Lists of essential drugs, medical supplies, and equipment by level of facility • Lists of medical equipment items that need to be supplied to certain facilities and the estimated costs
Examples of Decisions	• Development of standard treatment guidelines • In-service training conducted on the new treatment guidelines • Development of regular monitoring by district nurse officers of condition of key medical equipment

2. Selecting and Quantifying the Commodity Needs

Task

Develop a budget for an expanded maternity ward at a provincial hospital.

Who Needs to Know

Hospital Administrator
Hospital Supply Manager
Chief Pharmacist
Chief OB/GYN
Matron

What to Ask

What are the essential commodities and how much is needed to provide appropriate treatment for the services provided by the maternity ward?

Application of CES

Task 1—Identify a set of services to be provided at the new maternity ward that requires drugs, medical supplies, and equipment.

Task 2—Use the CES Model to establish lists of required commodities for each of the identified conditions based on agreed treatment protocols.

Task 3—Conduct the CES Health Care Provider Interviews with staff who will be working at the new ward and review medical records of randomly selected patients, to determine actual practice. Adjust the treatment regimens identified for each selected condition as appropriate for budgeting purposes.

Task 4—Analyze past service volume data from the hospital records and estimate the number of cases for services to be provided by the new maternity ward, taking into account the expected increase in demand.

Task 5—Enter the estimated caseload for the new ward into the CES Model to calculate the total requirements for the commodities. Using the Model, compare cost implications of different sets of price information quoted by several suppliers.

Output

- Commodity budget
- Lists of commodities and procurement strategy

Example of Decisions

The health care provider interviews and the record reviews revealed a number of problematic treatment practices and lack of knowledge among some staff. A decision was made to develop training materials and seminars for clinical staff to address these problems.

3. Planning the Expansion of Services

Task

Determine types of reproductive health services that can be integrated into the family planning clinic network run by a nongovernmental organization (NGO).

Who Needs to Know

Program Coordinator
Clinical Training Officer
Supply Manager

What to Ask

What additional commodities are needed to provide new reproductive health services?
How much would it cost for additional commodities to cover the target population?
Do the staff have adequate knowledge about the new services?

Application of CES

Task 1—Form an expert panel to advise on the development of a list of potential new services. Prepare the CES Model by modifying, as appropriate, the national standard treatment guidelines.

Task 2—Collect cost data for identified commodities through a mini-survey of major local suppliers. Use the current price list from the government central medical store as a reference.

Task 3—Conduct Health Care Provider Interviews with the staff at the family planning clinics affiliated with the organization to determine capacity of staff at the lowest level of care to diagnose and provide appropriate treatment for some of the more complicated conditions under consideration. Identify training needs.

Output

- Treatment protocols for selected reproductive health services with accompanying training material
- Lists and the budget for drugs, medical supplies, and equipment that need to be purchased

Example of Decisions

- A plan and schedule for the phased approach to integrate reproductive health services into the existing family planning services

4. Assessing the Availability of Essential Reproductive Health Commodites

Task

Assess the availability of key commodities for services to pregnant women at health facilities in the district.

Who Needs to Know

District Supply Manager
District Reproductive Health Program Officer

What to Ask

What are the essential commodities that should always be available at different levels of facilities to provide the basic services for pregnant women?
Are these essential commodities actually available at facilities in the district?

Application of CES

Task 1—Develop lists of essential commodities for each level of care using the CES Model.

Task 2—Conduct the CES Survey to examine current availability and past stock-out patterns of tracer commodities at health facilities.

Task 3—Conduct the CES Survey at the maternity wards of hospitals to learn about the extent to which pregnant mothers were asked to pay out of pocket for necessary drugs and supplies.

Task 4—Conduct the CES Pharmacy Survey at sample retail pharmacies to determine the role of private pharmacies as a source of essential reproductive health commodities.

Task 5—Assess the availability and cost of RH commodities through analysis of the Survey data.

Output

- Availability pattern of tracer commodities at facilities and private pharmacies within the district
- Percentage of pregnant women having to purchase commodities for their deliveries
- Average out-of-pocket spending for commodities by pregnant women

Examples of Decisions

- District nurse official was appointed as the coordinator for the new monitoring system for the availability of key reproductive health commodities at health facilities in the district.
- An agreement was reached to set up a community pharmacy, run by the association of district pharmacies, within the district hospital compound to provide pregnant women with selected reproductive health commodities at lower prices than the retail prices.

5. Improving Commodity Use

Task

Determine the extent of compliance of health care providers with the standard treatment guidelines and determine the possible factors that may impede compliance.

Who Needs to Know

Policy makers (e.g., National Pharmaceutical and Therapeutic Committee, the OB/GYN Association)
Provincial and District Medical Officers
Nurse/Midwife Training Officer

What to Ask

What are the compliance rates of the health care providers with the national standard treatment guidelines?
How can the compliance rate be improved?

Application of CES

Task 1—Conduct the CES Health Care Provider Interview, the Mothers Interview, and review patient records. Compare the survey results with national treatment guidelines to identify gaps in treatment practices of certain conditions as well as in the knowledge of health personnel.

Task 2—Use the CES Model to prepare both a Country-Specific Model (using national standard treatment guidelines) and an Actual Model (based on treatment patterns obtained from the CES Survey). Compare the episodic costs and the total estimated costs of required commodities of the country-specific and actual models to identify discrepancies for further review and analysis.

Task 3—Conduct the Health Facility Survey to assess and quantify the extent of shortage of some key drugs and an oversupply of other drugs (with reference to the tracer commodities based on the standard treatment guidelines suggested). Identify possible reasons for stock imbalances (e.g., low compliance with the guidelines contributes to the oversupply of some commodities, or recommended treatments not provided due to the lack of necessary commodities).

Output

- Reported and observed practice pattern data of health care providers
- Comparison of episodic and total commodity costs according to the STGs and observed practice patterns
- Availability patterns of key commodities

Examples of Decisions

- Modifications of pre- and in-service training materials for health care providers to strengthen areas of knowledge and skills that are not currently addressed sufficiently
- Revisions of the current standard treatment guidelines to take into account the training and availability of commodities at different levels of care

APPENDIX A. REPRODUCTIVE HEALTH MANAGEMENT DRUG MONOGRAPHS

Introduction

This appendix, prepared by the United States Pharmacopeia (USP), provides information on prescription and over-the-counter medicines and nutritional supplements commonly used in reproductive health management (RHM). Each drug is described in a monograph. The drug monographs are arranged in alphabetical order and are listed in the Contents (see page A-iii). The Index of Therapeutic Groups and Drugs (see page A-v) shows them grouped by their therapeutic indications to give flexibility to the *Guide*'s users for the selection of information on a group of medicines or on a specific drug.

The monographs have been abstracted from the 19th edition of the U.S. Pharmacopeia's *USP Dispensing Information,* Volume I—*Drug Information for the Health Care Professional,* and Volume II—*Advice for the Patient.*

General Information Contained in the Monographs

Each monograph begins with the drug's International Nonproprietary Name (INN) and a short description of its category of use.

Indications

Only the indications pertinent to the use in reproductive health management or related to reproductive health problems are described.

Table of Indications and Doses

A table format shows the RHM indications and the usual doses, regimen, and length of treatment.

Common Brand Names, Dosage Forms, and Strengths

The brand names available from various countries and the most common dosage forms and strengths are listed to provide the user with a better understanding of the dosage choices.

Considerations Before Using

This section provides clinical information on the following:

Precautions to Consider
The special concerns relative to the use of the drug in pregnant patients, in nursing women, and sometimes in infants are listed.

Drug Interactions and / or Related Problems
Medications that if administered concurrently with the monograph drug may cause a decrease in efficacy, adverse effects, or potential toxicity are presented.

Medical Considerations / Contraindications
The patient's existing medical conditions that may affect the use of the drug are listed.

Side / Adverse Effects

Selected side effects are listed according to whether or not they usually need medical attention. Presenting symptoms are listed in parentheses.

Overdose

Information on therapeutic and toxic concentrations of the drug, time to onset of overdose symptoms, clinical effects of overdose, and treatment of overdose are presented.

Packaging and Storage

The guidelines for each dosage form related to the type of container and the conditions of storage (e.g., temperature or protection from light or humidity) are listed.

Additional Information

Additional points of consideration regarding administration of the drug are highlighted. These points may include optimal schedule of administration, how the drug should be taken (e.g., swallowed whole, with meals), the recommended diet, pertinent inactive ingredients (e.g., sodium content), incompatibilities with other drugs or solutions, stability of the drug, or any other specific requirement.

Contents

Alphabetical List of the Drugs

Index of Therapeutic Groups and Drugs

Page

Ampicillin

Ampicillin is an antibacterial agent. It belongs to the group of the aminopenicillins and has activity against penicillin-sensitive gram-positive bacteria as well as *Escherichia coli*, *Proteus mirabilis*, *Salmonella* species, *Shigella* species, and *Haemophilus influenzae*. Many Enterobacteriaceae, *H. influenzae, Salmonella,* and *Shigella* species are resistant to this penicillin because of beta-lactamase production by these organisms.

Indications

Ampicillin is indicated for the treatment of maternal and neonatal septicemia and other bacterial infections or urinary tract infections caused by susceptible organisms. Ampicillin is also indicated for the treatment of chlamydial infections in pregnant women who cannot tolerate erythromycin.

Table of Indications and Doses

Indications	Adult Dose	Infant Dose
Antibacterial	Oral, 250 to 500 mg every 6 hours up to 4 grams a day; or Intramuscular or intravenous (IM or IV), 250 to 500 mg (base)* every 6 hours up to 14 grams a day.	Infants and children up to 20 kg of body weight: Oral,12.5 to 25 mg per kg of body weight every 6 hours; or IM or IV, 12.5 mg (base) per kg of body weight every 6 hours.
Septicemia, bacterial	IM or IV, 1 to 2 grams (base) every 3 to 4 hours.	

**Note:* The dosing and strengths of the injectable dosage forms available are expressed in terms of ampicillin base (not the sodium salt).

Common Brand Names, Dosage Forms, and Strengths

Brand names available:
Adobacillin; Alfasilin; Almopen; Alpen; Amblosin; Amfipen; Amipenix; Ampen; Ampensaar; Ampicil; Ampicin; Ampicina; Ampicyn; Ampifen; Ampifrinil; Ampigal; Ampilan; Ampiland; Ampilean; Ampilin; Ampilisa; Ampinebiot; Ampisil; Ampisina; Ampispectrin; Ampi-Tablinen 1000; Ampitex; Ampitotal; Ampixyl; Amplacilina; Amplicid; Amplipenyl; Ampliscocil; Amplital; Amplitor; Amplizer; Anhypen; Anticil; Apo-Ampi; Argocillina; Austrapen; Bacterion; Biocellina; Bionacillin; Bonapicillin; Bristin; Britapen Oral; Britcin; Bropicilina; Citicil; Copharcilin; Deripen; Dhacillin; Doktacillin; Drisilin; Eskaycillin; Espectrosira; Fidesbiotic; Fortapen; Geycillina; Gramcillina; Grampenil; Ikapen; Iwacillin; Lampocillina; Lifeampil; Makrosilin; Makrosilin; Marisilan; Maxicilina; NC-Cillin; Negopen; Neoflaina; Novo-Ampicillin; Nu-Ampi; Nu-Ampicillin; Nuvapen; Omnipen; Omnipen-N; Penbisin; Penbritin; Penibrin; Penimic; Penodil; Penoral; Penorsin; Penstabil; Pentrexyl; Pentricine; Pfizerpen A; Platocillina; Policilin; Polycillin; Polycillin-N; Principen; Quimetam; Resam; Rivocillin; Semicillin; Sentapent; Servicillin; Standacillin; Tolimal; Totacillin; Totacillin-N; Totalciclina; Totapen; Vidopen; Zymopen.

Generics may be available.

Ampicillin may be available in the following dosage forms and strengths:

Oral dosage forms—

Ampicillin Capsules USP: 250 and 500 mg.

Ampicillin for Oral Suspension USP: 100 mg per mL and 125, 250, and 500 mg per 5 mL.

Injectable dosage form—

Ampicillin for Injection USP: 125 mg (base), 250 mg (base), 500 mg (base), 1 gram (base), 2 grams (base), and 10 grams (base).

Considerations Before Using

Precautions to Consider

- Pregnancy

Ampicillin crosses the placenta. However, problems in humans have not been reported. Studies in animals have revealed no evidence of adverse effects in the fetus.

- Breastfeeding

Penicillins are distributed into breast milk. Although significant problems in humans have not been documented, use of penicillins by nursing mothers may lead to sensitization, diarrhea, candidiasis, and skin rash in the infant.

Drug Interactions and / or Related Problems

Ampicillin should not be administered to patients using the following medicines:

- Aminoglycosides
- Contraceptives, estrogen-containing, oral
- Methotrexate
- Probenecid

Chloramphenicol and probenecid may interfere with ampicillin's activity and elimination but may be administered concurrently.

Medical Considerations / Contraindications

Except under special circumstances, this medication should not be used when the following medical problem exists:

- Allergy to penicillins

Risk-benefit should be considered when the following medical problems exist:

- Gastrointestinal disease, especially antibiotic-associated colitis
- Kidney disease
- Mononucleosis, infectious

Side / Adverse Effects

Medical attention is needed if any of the following side effects occurs:

- Allergic reactions (fast or irregular breathing; puffiness or swelling around the face; shortness of breath; sudden and severe decrease in blood pressure)

- *Clostridium difficile* colitis (severe abdominal or stomach cramps and pain; abdominal tenderness; watery and severe diarrhea, which may be bloody; fever)
- Exfoliative dermatitis (red, scaly skin)
- Pain at site of injection
- Serum sickness–like reactions (skin rash; joint pain; fever)
- Skin rash, hives, or itching
- Seizures (sudden episode of impairment or loss of consciousness; abnormal movements; and sensory disturbances)

Medical attention may be needed if any of the following side effects continues or is bothersome:

- Gastrointestinal irritations (mild diarrhea; nausea or vomiting)
- Headache
- Oral candidiasis (sore mouth or tongue; white patches in mouth and/or on tongue)
- Vaginal candidiasis (vaginal itching and discharge)

Packaging and Storage

Store below 40 °C (104 °F), preferably between 15 and 30 °C (59 and 86 °F), unless otherwise specified by the manufacturer. For oral dosage forms—store in a tight container. For injectable dosage forms—protect reconstituted solution from freezing.

Additional Information

- Capsules and oral suspension should be taken with a full glass of water on an empty stomach (either 1 hour before or 2 hours after a meal).

- The sodium content of the injectable dosage form is approximately 3.4 mEq (3.4 mmol) per gram of ampicillin, depending on the manufacturer. This must be considered with patients on restricted sodium intake.

Incompatibilities
Administering penicillins and aminoglycosides, such as gentamicin, concurrently may result in substantial mutual inactivation. If these two groups of antibacterials are to be administered concurrently, they should be administered at different sites at least 1 hour apart.

Do not mix penicillins and aminoglycosides in the same intravenous bag, bottle, or tubing.

Stability
After reconstitution, oral suspensions retain their potency for 7 days at room temperature or for 14 days if refrigerated, depending on manufacturer.

After reconstitution, solutions for intramuscular or direct intravenous use retain their potency for 1 hour.

After reconstitution for intravenous infusion, solutions in concentrations up to 30 mg per mL retain at least 90% of their potency for 2 to 8 hours at room temperature or for up to 72 hours if refrigerated in suitable diluents.

Atropine

Atropine is an anticholinergic agent.

Indications

Atropine is indicated to prevent or reduce excessive salivation and respiratory tract secretions prior to anesthesia.

Table of Indications and Doses

Indication	Oral Adult Dose	Injectable Adult Dose
Prophylaxis of excessive salivation and respiratory tract secretions in anesthesia	Oral, 2 mg.	Intramuscular (IM), 0.2 to 0.6 mg, one-half hour to 1 hour before surgery.

Common Brand Names, Dosage Forms, and Strengths

Brand names available:
Atropair; AtroPen; Atropisol; Atropt; Dey-Dose; Dysurgal N; Liotropina; Pentatropine; Sperstropine; Sulfatropinol; Tropintran; Vitatropin.

Generics may be available.

Atropine is available in the following dosage forms and strengths:

Oral dosage forms—
- Atropine Sulfate Tablets USP: 0.4 mg.
- Atropine Sulfate Soluble Tablets: 0.4 and 0.6 mg.

Injectable dosage forms—
- Atropine Sulfate Injection USP: 0.05, 0.1, 0.3, 0.4, 0.5, 0.6, 0.8, and 1 mg per mL.

Considerations Before Using

Precautions to Consider

- Pregnancy

Atropine crosses the placenta**.** Intravenous administration of atropine during pregnancy or near term may produce tachycardia (fast heartbeat) in the fetus.

- Breastfeeding

Atropine is distributed into breast milk. **Continuous use of atropine is to be avoided during nursing** since infants are usually very sensitive to the effects of anticholinergics.

Drug Interactions and / or Related Problems

Atropine should not be administered to patients using the following medicines:

- Antacids and adsorbent antidiarrheals

- Anticholinergics, other
- Cyclopropane
- Ketoconazole
- Potassium chloride

Medical Considerations / Contraindications
Risk-benefit should be considered when the following medical problems exist:

- Cardiac disease (arrhythmias, congestive heart failure, coronary artery disease, mitral stenosis)
- Esophagitis (reflux) or pyloric obstruction
- Gastrointestinal tract obstructive disease, with or without hiatal hernia
- Glaucoma (open-angle or angle-closure)
- Hemorrhage, acute, with unstable cardiovascular status
- Intestinal atony or paralytic ileus
- Myasthenia gravis
- Toxemia of pregnancy
- Urinary retention or obstructive uropathy
- Ulcerative colitis

Side / Adverse Effects

Medical attention is needed if any of the following side effects occurs:

- Allergic reaction (skin rash, hives, or itching)
- Confusion
- Increased intraocular pressure (eye pain)
- Orthostatic hypotension (dizziness, feeling faint, or continuing lightheadedness)

Medical attention may be needed if any of the following side effects continues or is bothersome:

- Bloated feeling
- Constipation
- Decreased flow of breast milk
- Decreased salivary secretion and sweating; dryness of mouth, nose, throat, or skin
- Difficult urination
- Difficulty in eye accommodation (blurred vision)
- Headache
- Loss of memory
- Mydriatic effect (dilatation of pupils; increased sensitivity of eyes to light)
- Nausea or vomiting
- Redness or other signs of irritation at injection site
- Unusual tiredness or weakness

Stimulation or depression of the central nervous system (CNS) may occur depending on the dose.

Overdose

Clinical effects of overdose:

- Blurred vision, continuing or changes in near vision
- Clumsiness or unsteadiness
- Confusion
- Difficulty in breathing
- Dizziness
- Drowsiness, severe
- Dryness of mouth, nose, or throat, severe
- Fast heartbeat
- Fever
- Hallucinations
- Muscle weakness, severe
- Nervousness, unusual excitement, restlessness, or irritability
- Seizures
- Slurred speech
- Tiredness, severe
- Unusual warmth, dryness, and flushing of the skin

Recommended treatment of overdose includes:

- To decrease absorption: Induction of vomiting and/or gastric lavage with 4% tannic acid solution; administration of a slurry of activated charcoal.

- Specific treatment:
  - To reverse severe anticholinergic symptoms, slow, intravenous administration of **physostigmine** (0.5 to 2 mg at rate not exceeding 1 mg per minute; may be given in repeated doses of 1 to 4 mg as needed and up to a total dose of 5 mg).
  - Or, **neostigmine methylsulfate** (administered intramuscularly 0.5 to 1 mg, repeated every 2 to 3 hours, or intravenously 0.5 to 2 mg, repeated as needed).
  - To control excitement, small doses of a short-acting barbiturate (100 mg of thiopental sodium) or benzodiazepines, or 2% solution of chloral hydrate administered rectally.
  - To restore blood pressure, an infusion of norepinephrine bitartrate or metaraminol.

- Supportive care: Artificial respiration with oxygen, adequate hydration, and symptomatic treatment as necessary.

Packaging and Storage

Store below 40 °C (104 °F), preferably between 15 and 30 °C (59 and 86 °F), unless otherwise specified by manufacturer. For oral dosage forms—store in a well-closed container. For injectable dosage forms—protect from freezing.

Additional Information

- Tolerance to some of the adverse reactions may develop following continued use, but effectiveness may also be reduced.
- The intravenous injection of atropine should be administered slowly.

Cephalosporins: Cefixime and Ceftriaxone

Cephalosporins are antibacterial agents. Cephalosporins have been classified by groups (called "generations") based on their spectrum of antibacterial activity. Cefixime and ceftriaxone are cephalosporins of the third generation.

Indications

Third-generation cephalosporins are used in the treatment of serious gram-negative bacterial infections, including pelvic inflammatory disease (such as endometritis) and urinary tract infections caused by susceptible organisms.

Single doses of cefixime or ceftriaxone are indicated in the treatment of uncomplicated gonorrhea.

Table of Indications and Doses

Indication	Adult Dose
Gonorrhea, uncomplicated	Cefixime: Oral, 400 mg as a single dose.
	Ceftriaxone: Intramuscular (IM), 250 mg (base)* as a single dose.
Urinary tract infections, uncomplicated	Cefixime: Oral, 200 mg every 12 hours; or 400 mg once a day.
Antibacterial, pelvic inflammatory disease (PID)	Ceftriaxone: Intravenous infusion, 1 to 2 grams (base)* every 24 hours; or 500 mg to 1 gram every 12 hours.

**Note:* The dosing and strengths of the injectable dosage forms available are expressed in terms of ceftriaxone base (not the sodium salt).

Common Brand Names, Dosage Forms, and Strengths

Brand names available:
For cefixime:
Aerocef; Cefixoral; Cefspan; Cephoral; CFIX; Denvar; Necopen; Suprax; Tricef; Unixime.
For ceftriaxone:
Acantex; Lendacin; Longacef; Rocefallin; Rocefin; Rocephalin; Rocephin.

Cefixime and ceftriaxone are available in the following dosage forms and strengths:

Oral dosage forms—

Cefixime for Oral Suspension USP: 100 mg per 5 mL (available in 50-, 75-, and 100-mL bottles).

Cefixime Tablets USP: 200 and 400 mg.

Injectable dosage forms—

Ceftriaxone Injection USP:1 gram (base) per 50 mL and 2 grams (base) per 50 mL

Ceftriaxone for Injection USP: 250 mg (base), 500 mg (base), 1 gram (base), 2 grams (base), and 10 grams (base).

Considerations Before Using

Precautions to Consider

- Pregnancy

Cephalosporins cross the placenta. Adequate and well-controlled studies have not been done in humans. However, studies in animals have not shown that these cephalosporins (cefixime and ceftriaxone) cause adverse effects in the fetus.

- Breastfeeding

It is not known whether cefixime is distributed into breast milk. Ceftriaxone is distributed into breast milk in low concentrations. However, problems in humans have not been documented.

Drug Interactions and / or Related Problems

Cephalosporins should not be administered to patients using the following medicines:

- Platelet aggregation inhibitors such as salicylates, nonsteroidal anti-inflammatory drugs (NSAIDs), or sulfinpyrazone
- Probenecid

Medical Considerations / Contraindications

Except under special circumstances, these medications should not be used when the following medical problems exist:

- Previous allergic reaction to penicillins, penicillin derivatives, penicillamine, or cephalosporins

Risk-benefit should be considered when the following medical problems exist:

- Gastrointestinal disease, especially ulcerative colitis, regional enteritis, or antibiotic-associated colitis
- Kidney disease

Side / Adverse Effects

Medical attention is needed if any of the following side effects occurs:

- Allergic reactions (bronchospasm; hypotension)
- Erythema multiforme or Stevens-Johnson syndrome (blistering, peeling, or loosening of the skin or mucous membranes)
- Hearing loss
- Hemolytic anemia, immune, drug-induced (unusual tiredness or weakness; yellow eyes and skin)
- Hypersensitivity reactions (fever; skin itching, rash; redness; swelling)
- Hypoprothrombinenia (unusual bleeding or bruising)
- Pseudomembranous colitis (abdominal or stomach cramps and pain, severe; abdominal tenderness; diarrhea, severe and watery, which may also be bloody; fever)

- Renal dysfunction (decrease in urine output or decrease in urine-concentrating ability)
- Seizures—with high doses and in patients with renal dysfunction
- Serum sickness–like reactions (fever; pain in the joints; skin rash)
- Thrombophlebitis (pain, redness, and swelling at site of injection)

For ceftriaxone only:

- Biliary "sludge" or pseudolithiasis (abdominal pain; anorexia; nausea and vomiting)

Medical attention may be needed if any of the following side effects continues or is bothersome*:*

- Gastrointestinal irritations (abdominal cramps; diarrhea, mild; nausea or vomiting)
- Headache
- Oral candidiasis (sore mouth or tongue)
- Vaginal candidiasis (vaginal itching and discharge)

Note: Pseudomembranous colitis may also occur after medication is discontinued.

Packaging and Storage

For oral dosage forms**—**store below 40 °C (104 °F), preferably between 15 and 30 °C (59 and 86 °F), unless otherwise specified by the manufacturer. Store in a tight container.

For injectable dosage forms—Cetriaxone Injection USP—store between –25 and –10 °C (–13 and 14 °F), unless otherwise specified by the manufacturer.

Ceftriaxone for Injection USP—Prior to reconstitution, store below 25 °C (77 °F), preferably between 15 and 30 °C (59 and 86 °F), unless otherwise specified by manufacturer. Protect from light.

Additional Information

Incompatibilities

- The admixture of ceftriaxone with other medications, including pentamidine isoethionate, or with labetalol hydrochloride is not recommended.

- The admixture of penicillins or cephalosporins with aminoglycosides may result in substantial mutual inactivation. If they are administered at the same time, they should be administered at separate sites. They should not be mixed in the same intravenous bag or bottle.

For cefixime:

- Cefixime is administered orally as an oral suspension or tablets. The oral suspension form of cefixime results in higher peak blood concentrations than the tablet when administered at the same dose.
- After reconstitution, cefixime oral suspension retains its potency for 14 days at room temperature or if refrigerated.
- Patients with renal function impairment may require a reduction in the dose.

For ceftriaxone:

- May contain 3.6 mEq of sodium per gram.
- Patients with impaired hepatic function do not generally require a reduction in dose. However, in patients with both impaired hepatic and renal function, the daily dose should not exceed 2 grams.
- Intravenous infusions should be administered over a period of 30 minutes.

For Ceftriaxone Injections USP:

- Injections should be stored frozen and thawed at room temperature before administration, making sure that all crystals have melted. Once thawed, solutions should not be refrozen.
- Do not use solution if it is cloudy or contains a precipitate.

For Ceftriaxone for Injection USP:

- After reconstitution for intramuscular use, solutions retain at least 90% of their potency for 1 to 3 days at room temperature (25 °C [77 °F]) or for 3 to 10 days if refrigerated at 4 °C (39 °F), depending on concentration and diluent.
- After reconstitution for intravenous use, solutions retain at least 90% of their potency for 3 days at room temperature (25 °C [77 °F]) or for 10 days if refrigerated at 4 °C (39 °F), when stored in glass or polyvinyl chloride (PVC) containers in suitable diluent (see manufacturer's package insert).
- After reconstitution for intravenous use with 5% dextrose injection or 0.9% sodium chloride injection, solutions at concentrations of 10 to 40 mg per mL retain their potency for 26 weeks at –20 °C (–4 °F) when stored in PVC or polyolefin containers. Frozen solutions should be thawed at room temperature. Once thawed, solutions should not be refrozen.

Chloroquine

Chloroquine is an antiprotozoal (anti-unicellular microorganisms) agent.

Indications

Chloroquine is indicated in the prevention and treatment of malaria caused by *Plasmodium vivax, P. ovale, P. malariae,* and chloroquine-susceptible strains of *P. falciparum*. The cure for *P. vivax* and *P. ovale* malaria also requires treatment with primaquine.

Note: Chloroquine-resistant strains of *P. falciparum* are now in all malarious areas except Central America west of the Canal Zone, the Middle East, and the Caribbean. Chloroquine is still the drug of choice for the treatment of susceptible strains of *P. falciparum, P. vivax, P. malariae*, and *P. ovale*. However, chloroquine-resistant *P. vivax* has been reported.

Table of Indications and Doses

Indications	Adult Dose
Malaria (prevention)	Oral, 500 mg (300 mg base*) once every 7 days.
Malaria (treatment)	Oral, initially 1 gram (600 mg base*), then 500 mg (300 mg base*) in 6 to 8 hours, and 500 mg (300 mg base*) once a day on the second and third days; or Intramuscular, initially 200 to 250 mg (160 to 200 mg base*), repeated in 6 hours if necessary, not to exceed 1 gram (800 mg base*) in the first 24 hours.

Note: The dosing and strengths of dosage forms available are expressed in terms of chloroquine base (not the salt).

Common Brand Names, Dosage Forms, and Strengths

Brand names available:
Aralen; Aralen HCl; Arechin; Arthrabas; Arthrochin; Avloclor; Bemaphate; Chemochin; Chlorochin; Cidanchin; Clorochina; Delagil; Dichinalex; Heliopar; Imagon; Lagaquin; Letaquine; Malarex; Quinachlor; Resochin; Rivoquine; Serviquin; Silbesan; Siragon; Tresochin; Weimerquin.

Generics may be available.

Chloroquine is available in the following dosage forms and strengths:

Oral dosage form—

Chloroquine Phosphate Tablets USP: 250 mg (equivalent to 150 mg base) and 500 mg (equivalent to 300 mg base).

Injectable dosage form—
Chloroquine Hydrochloride Injection USP: 50 mg (equivalent to 40 mg base) per mL.

Considerations Before Using

Precautions to Consider

- Pregnancy

Chloroquine crosses the placenta. Use is not recommended during pregnancy except in the suppression or treatment of malaria since malaria poses greater potential danger to the mother and the fetus (i.e., abortion and death) than prophylactic administration of chloroquine. Chloroquine, given in weekly chemoprophylactic doses, has not been shown to cause adverse effects in the fetus. However, risk-benefit must be considered since chloroquine, given in therapeutic doses, has been shown to cause central nervous system (CNS) damage, including ototoxicity; congenital deafness; retinal hemorrhages; and abnormal retinal pigmentation.

- Breastfeeding

Chloroquine is distributed into breast milk. Risk-benefit must be considered since infants and children are especially sensitive to the effects of chloroquine.

Drug Interactions and / or Related Problems

Should not be administered to patients using the following medicine:

- Penicillamine

Medical Considerations / Contraindications

Risk-benefit should be considered when the following medical problems exist:

- Blood disorders, severe
- Liver disease
- Neurological disorders, severe
- Retinal or visual field changes

Side / Adverse Effects

Medical attention is needed if any of the following side effects occurs:

- Blood toxicity such as—
  - Agranulocytosis or neutropenia (sore throat and fever)
  - Aplastic anemia (weakness; fatigue)
  - Thrombocytopenia (bleeding; bruising)
- Cardiovascular toxicity such as hypotension (feeling faint or lightheaded)
- Emotional changes or psychosis (mood or other mental changes)
- Neuromyopathy (increased muscle weakness)
- Ocular toxicity such as corneal opacities, keratopathy, or retinopathy (blurred vision or any other change in vision)
- Ototoxicity (loss of hearing, buzzing or ringing in ears)
- Seizures

Medical attention may be needed if any of the following side effects continues or is bothersome:

- Bleaching of hair or increased hair loss
- Ciliary muscle dysfunction (difficulty in reading)

- Discoloration (blue-black) of skin, fingernails, or inside of mouth
- Gastrointestinal irritation (diarrhea; loss of appetite; nausea; stomach cramps or pain; vomiting)
- Headache
- Itching
- Skin rash

Note: Blurred vision or any other change in vision may need medical attention if it occurs or progresses after medication is discontinued.

Overdose

After ingestion of an overdose of chloroquine, toxic symptoms may occur within 30 minutes and death may occur as soon as 3 hours after ingestion. In adults, a 2.25- to 3-gram dose of chloroquine phosphate may be fatal.

Clinical effects of acute overdose:

- Cardiovascular toxicities (conduction disturbances; hypotension)
- Neurotoxicity (drowsiness; headache; hyperexcitability; seizures; coma)
- Respiratory and cardiac arrest
- Visual disturbances (blurred vision)

Treatment of overdose: Since there is no specific antidote, treatment of chloroquine overdose should be symptomatic and supportive:

- To decrease absorption: Gastric lavage may be performed to empty the stomach. Activated charcoal (5 to 10 times the estimated dose of chloroquine ingested) should be administered with a cathartic.
- To enhance elimination: Forcing diuresis and acidifying the urine with ammonium chloride. The dose of acidifying agent should be adjusted to maintain a urinary pH of 5.5 to 6.5. Monitoring plasma potassium is recommended. Use with caution in patients with kidney disease and/or metabolic acidosis.
- Specific treatment:
  - For seizures: Treat with intravenous diazepam (in 2.5 to 5 mg increments).
  - For hypotension and circulatory shock: Fluids should be administered at a sufficient rate to maintain urine output.
  - Intravenous pressors and/or inotropic drugs may be administered if required. High-dose diazepam infusion has been reported to improve hemodynamic function. Epinephrine has been shown to decrease the myocardial depressant and vasodilatory effects of chloroquine.
- Supportive care: Securing and maintaining a patent airway, administering oxygen, and instituting assisted or controlled respiration may be required.

Packaging and Storage

For Chloroquine Phosphate Tablets USP—store below 40 °C (104 °F), preferably between 15 and 30 °C (59 and 86 °F), unless otherwise specified by the manufacturer. Store in a well-closed container.

For Chloroquine Hydrochloride Injection USP—store below 40 °C (104 °F), preferably between 15 and 30 °C (59 and 86 °F), unless otherwise specified by the manufacturer. Protect from freezing.

Additional Information

- For oral dosage form: Chloroquine should be taken with meals or a glass of milk to minimize the risk of gastrointestinal irritation.

- For prevention of malaria: The medication should be started 1 to 2 weeks before entering the malarious area and should be continued for 4 weeks after leaving the area.

Ciprofloxacin

Ciprofloxacin is an antibacterial agent.

Ciprofloxacin belongs to the Fluoroquinolones group. Fluoroquinolones are broad-spectrum anti-infective agents, active against a wide range of aerobic gram-positive and gram-negative organisms. They are active *in vitro* against most Enterobacteriaceae and have good activity against penicillin-resistant strains of *Neisseria gonorrhoeae*, beta-lactamase–producing strains of *Haemophilus influenzae, Moraxella (Branhamella) catarrhalis*, and some gram-negative bacilli that are resistant to other antimicrobial agents. Ciprofloxacin is the most active fluoroquinolone against *Pseudomonas aeruginosa*.

Indications

Ciprofloxacin is indicated in the treatment of endocervical and urethral gonorrhea and bacterial urinary tract infections caused by susceptible organisms.

Table of Indications and Doses

Indication	Adult Dose
Gonorrhea, endocervical and urethral	Oral, 250 mg (base)* as a single dose.
Urinary tract infections	Acute uncomplicated: Oral 100 mg (base)* every 12 hours for 3 days.
	Mild or moderate: Oral, 250 mg (base)* every 12 hours for 7 to 14 days; or Intravenous (IV) infusion 200 mg every 12 hours.
	Severe or complicated: Oral, 500 mg (base)* every 12 hours for 7 to 14 days; or IV infusion, 400 mg every 12 hours.

**Note:* The dosing and strengths of oral dosage forms available are expressed in terms of ciprofloxacin base.

Common Brand Names, Dosage Forms, and Strengths

Brand names available:
Bayterin; Ciflox; Ciprinol; Cipro; Ciprobay; Cipro I.V.; Ciproxin; Flociprin; Flunase; Novidat; Ofitin; Proxacin.

Ciprofloxacin is available in the following dosage forms and strengths:

Oral dosage forms—

Ciprofloxacin for Oral Suspension: 250 mg (base) per 5 mL (5%) and 500 mg (base) per 5 mL (10%).

Ciprofloxacin Tablets USP: 100 mg (base), 250 mg (base), 500 mg (base), and 750 mg (base).

Injectable dosage forms—

Ciprofloxacin Injection USP: 200 mg per 20 mL, 400 mg per 40 mL, and 1200 mg per 120 mL (in sterile water for injection, requiring dilution prior to administration).
200 mg per 100 mL and 400 mg per 200 mL (premixed in 5% dextrose injection).

Considerations Before Using

Precautions to Consider

- Pregnancy

Ciprofloxacin crosses the placenta. Adequate and well-controlled studies in humans have not been done. However, since ciprofloxacin has been shown to cause arthropathy in immature animals, its use is not recommended during pregnancy.

- Breastfeeding

Ciprofloxacin is distributed into breast milk. Fluoroquinolones have been shown to cause lesions in joints and other signs of arthropathy in immature animals. If an alternative antibiotic cannot be prescribed and ciprofloxacin must be administered, breastfeeding is not recommended**.**

Drug Interactions and / or Related Problems

Ciprofloxacin should not be administered to patients using the following medicines:

- Aminophylline, oxtriphylline, or theophylline
- Antacids containing aluminum, calcium, or magnesium
- Caffeine
- Didanosine
- Ferrous sulfate
- Phenytoin
- Sucralfate
- Warfarin

Medical Considerations / Contraindications

Except under special circumstances, this medication should not be used when the following medical problem exists:

- Allergy to fluoroquinolones or other chemically related quinolone derivatives

Risk-benefit should be considered when the following medical problems exist*:*

- Kidney disease or both kidney and liver disease

Side / Adverse Effects

Medical attention is needed if any of the following side effects occurs:

- CNS stimulation (acute psychosis; agitation; confusion; hallucinations; tremors)
- Hepatotoxicity (dark or amber urine; loss of appetite; pale stools; stomach pain; unusual tiredness or weakness; yellow eyes or skin)
- Hypersensitivity reactions (skin rash, itching, or redness; Stevens-Johnson syndrome; shortness of breath; swelling of face or neck; vasculitis)
- Interstitial nephritis (bloody or cloudy urine; fever; skin rash; swelling of feet or lower legs)
- Phlebitis (pain at site of injection)

- Pseudomembranous colitis (abdominal or stomach cramps and pain, severe; abdominal tenderness; watery and severe diarrhea, which may also be bloody; fever)
- Tendinitis or tendon rupture (pain in calves, radiating to heels; swelling of calves or lower legs)

Medical attention may be needed only if any of the following symptoms continues or is bothersome:

- CNS toxicity (dizziness or lightheadedness; headache; nervousness; drowsiness; insomnia)
- Gastrointestinal reactions (abdominal or stomach pain or discomfort, mild; diarrhea, mild; nausea or vomiting)
- Photosensitivity (increased sensitivity of skin to sunlight)

Overdose

Treatment of overdose:
Since there is no specific antidote for overdose of fluoroquinolone antibiotics, treatment should be symptomatic and supportive and may include the following:

- To decrease absorption: Induction of emesis or use of gastric lavage to empty the stomach.
- Specific treatment: Maintenance of adequate hydration.
- Supportive care: Supportive therapy.

Packaging and Storage

For oral dosage forms—

For Ciprofloxacin for Oral Suspension—prior to reconstitution, store below 25 °C (77 °F). After reconstitution, store below 30 °C (86 °F). Protect from freezing.
For Ciprofloxacin Tablets USP—Store below 30 °C (86 °F) in a well-closed container.

For injectable dosage form—

For Ciprofloxacin Injection USP—store in a cool place (between 8 and 15 °C [46 and 59 °F] or at controlled room temperature (between 20 and 25 °C [68 and 77 °F]), unless otherwise specified by manufacturer. Protect from light and freezing.

Additional Information

- Patients with kidney disease require a reduction in dosage based on their creatinine clearance.

- Ciprofloxacin oral suspension and tablets should be taken with a full glass of water and may be taken with meals (the rate of absorption may then be delayed) or on an empty stomach.

- Crystalluria has been reported, especially in patients with alkaline urine (pH 7 or above). Therefore, alkalinization of the urine should be avoided. Although crystalluria has been reported only rarely in humans, fluid intake should be sufficient to maintain urine output of at least 1200 to 1500 mL per day in adults.

- Ciprofloxacin oral suspension is stable for 14 days when stored in a refrigerator or at room temperature (below 30 °C [86 °F]).

- For injectable dosage form: Solutions that come from the manufacturer in 5% dextrose injection should not be diluted prior to intravenous infusion. The resulting solution should be infused over a period of at least 60 minutes. It is recommended that any other solutions be discontinued during infusion of ciprofloxacin.

Incompatibilities

Ciprofloxacin is incompatible with—

- Aminophylline
- Amoxicillin
- Cefepime
- Clindamycin
- Dexamethasone
- Floxacillin
- Furosemide
- Heparin
- Phenytoin

If ciprofloxacin is to be given concurrently with another medication, each medication should be administered separately according to the recommended dosage and route of administration for each medication.

Diazepam

Diazepam is an anti-anxiety agent, sedative, and anticonvulsant. Diazepam also has skeletal muscle relaxant, anti-tremor, and anti-emetic activities. Diazepam belongs to the benzodiazepines group.

Note: Diazepam is a controlled substance in the United States.

Indications

Diazepam is indicated as an adjunct in the treatment of convulsive disorders such as eclamptic convulsions (convulsion occuring during pregnancy).

Diazepam injections and rectal solutions are indicated as adjuncts in severe recurrent convulsive seizures. They are not recommended for maintenance anticonvulsant therapy; therefore, once the seizures are controlled, appropriate maintenance anticonvulsant therapy should be instituted.

Oral diazepam is indicated as short-term (7 to 14 days) adjunctive therapy in convulsive disorders.

Table of Indications and Doses

Indication	**Adult Dose**
Anticonvulsant	Oral, 2 to 10 mg 2 to 4 times a day; or Intravenous, initially 5 to 10 mg, the dose being repeated, if necessary at 10 to 15 minute intervals up to a total dose of 30 mg. If necessary this regimen may be repeated in 2 to 4 hours; or Rectal, 0.2 mg per kg of body weight rounded up to the next available unit dose. Dose may be repeated, if needed, in 4 to 12 hours.

Common Brand Names, Dosage Forms, and Strengths

Brand names available:
Aliseum; Amiprol; Anksiyolin; Ansiolin; Antenex; Apaurin; Apozepam; Apo-Diazepam; Armonil; Assival; Atensine; Avex; Bensedin; Betapam; Calmpose; Canazepam; Cercine; Ceregulart; Condition; Deprestop; Diaceplex; Dialag; Diapam; Diatran; Diastat; Diazem; Diazemuls; Diazepam; Diazepam Intensol; Diazidem; Dienpax; Dipam; Dizac; Dizam; Domalium; Doval; Drenian; Ducene; Duksen; E-Pam; Eridan; Erital; Euphorin; Faustan; Gewacalm; Hexalid; Horizon; Kratium; Lamra; Lembrol; Levium; Liberetas; Lizan; Lorinon; Mandro-Zep; Metil Gobanal; Meval; Neo-Calm; Neosorex; Nervium; Neurolytril; Noan; Notense; Novazam; Novo-Dipam; Paceum; Pacipam; Pax; PMS-Diazepam Psychopax; Q-Pam; Quetinil; Quievita; Relanium; Relivan; Remedium; Renborin; Rival; Saromet; Scriptopam; Sedapam; Sedipam;

Seduxen; Serenack; Serenamin; Serenzin; Solis; Somasedan; Sonacon; Stesolid; Stesolin; Stress-Pam; Tensium; Tensopam; Tiromne; Tranquase; Tranquirit; Umbrium; Valaxona; ValCaps; Valibrin; Valiquid; Valitran; Valium; Vivol; Zepam.

Generics may be available.

Diazepam is available in the following dosage forms and strengths:

Oral dosage forms—
Diazepam Oral Solution: 1 mg per mL, 5 mg per mL and 5 mg per 5 mL.
Diazepam Tablets USP: 2, 5, and 10 mg.

Injectable dosage forms—
Diazepam Injection USP: 5 mg per mL.
Sterile Diazepam Emulsion: 5 mg per mL.

Rectal dosage form—
Diazepam Rectal Gel: 10, 15, and 20 mg.

Considerations Before Using

Precautions to Consider

- Pregnancy

Diazepam crosses the placenta. Risk-benefit should be considered when diazepam is used as an anticonvulsant during pregnancy. **The use of diazepam should be avoided during the first trimester.** Regular use of diazepam during pregnancy may cause physical dependence with resulting withdrawal symptoms in the neonates.

- Labor

Use of benzodiazepines just prior to or during labor may cause neonatal flaccidity (muscle weakness).

- Delivery

When diazepam is administered in doses of more than 30 mg (especially intramuscularly or intravenously) to women within 15 hours before delivery, the neonate may develop apnea, hypotonia, hypothermia, reluctance to feed, and impaired metabolic response to cold stress.

- Breastfeeding

Diazepam is distributed into breast milk. Continuous use of diazepam by nursing mothers may cause sedation, feeding difficulties, and/or weight loss in the infant.

Drug Interactions and / or Related Problems

Diazepam should not be administered to patients using the following medicines:

- Central nervous system (CNS) depression–producing medications, other
- Fluvoxamine
- Itraconazole
- Ketoconazole
- Nefazodone

The use of alcohol during treatment with diazepam is not recommended.

Medical Considerations / Contraindications
Risk-benefit should be considered when the following medical problems exist:
- Alcohol intoxication, acute, with depressed vital signs
- Coma or shock
- Glaucoma, angle-closure, acute or predisposition to
- Myasthenia gravis
- Pulmonary disease, severe chronic obstructive

Side / Adverse Effects

Medical attention is needed if any of the following side effects occurs:
- Abnormal thinking, including delusions (false beliefs that cannot be changed by facts); depersonalization (loss of sense of reality); or disorientation
- Allergic reaction (skin rash, or itching)
- Anterograde amnesia (lack of memory of events that took place after benzodiazepine is taken)
- Anxiety
- Behavior changes, including bizarre behavior or decreased inhibition
- Blood dyscrasias including agranulocytosis (chills, fever, sore throat; unusual tiredness or weakness); anemia (unusual tiredness or weakness); leukopenia (chills, fever, sore throat); neutropenia (chills, fever, and/or sore throat; ulcers or sores in mouth or throat, continuing; unusual tiredness or weakness); thrombocytopenia (unusual bleeding or bruising)
- Confusion
- Extrapyramidal effects, dystonic (uncontrolled movements of body, including the eyes)
- Hypotension (low blood pressure)
- Liver disease (yellow eyes or skin)
- Mental depression
- Muscle weakness
- Paradoxical reactions including agitation; aggressive behavior; hallucinations; hostility or rage; insomnia; unusual excitement, irritability, or nervousness
- Phlebitis or venous thrombosis (redness, swelling, or pain at injection site)
- Seizures
- Tachycardia/palpitation (fast, pounding, or irregular heartbeat)

Medical attention may be needed if any of the following side effects continues or is bothersome:
- Abdominal or stomach cramps or pain
- Ataxia (clumsiness, unsteadiness)
- Blurred vision or other changes in vision
- Changes in libido (changes in sexual desire or ability)
- Constipation
- Diarrhea
- Dizziness
- Drowsiness
- Dryness of the mouth or increased thirst
- Euphoria (false sense of well-being)
- Headache
- Increased bronchial secretions or excessive salivation (watering of mouth)

- Muscle spasm
- Nausea or vomiting
- Problems with urination
- Slurred speech
- Tremor (trembling or shaking)
- Unusual tiredness or weakness

Medical attention may be needed if any of the following symptoms, indicating possible withdrawal, occurs (usually within 10 to 20 days after medication is discontinued):

- Abdominal or stomach cramps
- Confusion
- Convulsions
- Delirium (confusion as to time, place, or person)
- Depersonalization (loss of sense of reality)
- Hallucinations
- Increased sweating
- Insomnia (trouble in sleeping)
- Irritability
- Mental depression
- Muscle cramps
- Nausea or vomiting
- Nervousness
- Paranoid symptoms (feelings of suspicion and distrust)
- Paresthesias (tingling, burning, or prickly sensations)
- Perceptual disturbances including hyperacusis (increased sense of hearing); hypersensitivity to touch and pain; paresthesias (tingling, burning, or prickly sensations); or photophobia (sensitivity of eyes to light)
- Tachycardia (fast or pounding heartbeat)
- Tremor (trembling or shaking)

Note: Withdrawal symptoms are more common and often more severe in patients who have received high doses of a benzodiazepine over a prolonged period of time. However, symptoms have occurred following abrupt discontinuation of benzodiazepines that have been taken continuously for as few as 1 or 2 weeks. Abrupt discontinuation increases the chance of developing withdrawal symptoms, including life-threatening seizures. In some patients, withdrawal symptoms have occurred during gradual discontinuation or tapering of benzodiazepines.

Packaging and Storage

For Diazepam Oral Solution—store below 40 °C (104 °F), preferably between 15 and 30 °C (59 and 86 °F), in a well-closed container, unless otherwise specified by the manufacturer. Protect from freezing.

For Diazepam Tablets USP—store below 40 °C (104 °F), preferably between 15 and 30 °C (59 and 86 °F), unless otherwise specified by the manufacturer. Store in a tight, light-resistant container.

For Diazepam Injection USP—store below 40 °C (104 °F), preferably between 15 and 30 °C (59 and 86 °F), unless otherwise specified by the manufacturer. Protect from light. Protect from freezing.

For Sterile Diazepam Emulsion—store below 25 °C (77 °F), unless otherwise specified by the manufacturer. Protect from freezing. Protect from light.

For rectal dosage form—store between 15 and 30 °C (59 and 86 °F), unless otherwise specified by manufacturer.

Additional Information

- Intravenous administration of injectable dosage forms is usually preferred since absorption may be slow and erratic following intramuscular administration depending on injection site.

- If intramuscular injections of diazepam are used, they should be administered deeply into the deltoid muscle.

- For intravenous injections of diazepam, small veins such as those on the back of the hand or wrist should not be used and care should be taken to avoid intra-arterial administration or extravasion in order to reduce the possibility of venous thrombosis, phlebitis, local irritation, swelling, and vascular impairment.

- Intravenous injections of diazepam should be administered slowly into a large vein, taking at least 1 minute for each 5 mg (1 mL) of medication given.

- Continuous intravenous infusion is not recommended because of the possibility of precipitation of diazepam in intravenous fluids and adsorption of the medication to the plastic of infusion bags and tubing.

- If diazepam cannot be administered by direct intravenous injection, it may be injected slowly through infusion tubing as close as possible to the insertion point to minimize adsorption of the medication to the plastic tubing.

- Diazepam injection is physically incompatible with aqueous solutions.

- Sterile diazepam emulsion is an oil/water emulsion with a pH of approximately 8. It contains no preservatives and can support rapid microbial growth. Strict aseptic technique is required for its administration, which should be completed within 6 hours after the ampule has been opened. Mixing or diluting sterile diazepam emulsion with products or solutions other than its own emulsion base (Intralipid or Nutralipid) may destabilize the emulsion and result in potentially serious adverse reactions.

- Sterile diazepam emulsion is incompatible with morphine and glycopyrrolate.

- Infusion sets containing polyvinyl chloride should not be used for administration of diazepam emulsion; polyethylene-lined or glass infusion sets and polyethylene/polypropylene plastic syringes are recommended.

- Sterile diazepam emulsion should not be administered through a filter with a pore size of less than 5 microns, because the emulsion may be broken down.

Doxycycline

Doxycycline is an antibacterial and antiprotozoal agent. Doxycycline belongs to the Tetracyclines group.

Indications

Doxycycline is indicated in the prophylaxis of malaria due to *Plasmodium falciparum* in short-term travelers (< 4 months) going to areas with chloroquine- and/or pyrimethamine-sulfadoxine–resistant strains.

Doxycycline is indicated in the treatment of infections such as bacterial septicemias, chlamydial infections, genitourinary tract infections (including endocervical infections caused by *Chlamydia trachomatis*), gonorrhea, malaria, nongonoccocal urethritis (caused by *C. trachomatis* and *Ureaplasma urealyticum), s*exually transmitted diseases (granuloma inguinale or lymphogranuloma venereum caused by *C. trachomatis),* syphilis (caused by *Treponema pallidum),* and bacterial urinary tract infections caused by susceptible organisms (*E. coli* and *Klebsellia* species).

Table of Indications and Doses

Indication	**Adult Dose**
Antibacterial, antiprotozoal	Oral, 100 mg (base)* every 12 hours the first day, then 100 to 200 mg once a day or 50 to 100 mg every 12 hours. Intravenous (IV) infusion, 200 mg (base)* once a day; or 100 mg every 12 hours the first day, and 100 to 200 mg once a day the following days; or 50 to 100 mg every 12 hours.
Gonococcal infections (uncomplicated)	Oral, 100 mg (base)* every 12 hours for 7 days; or 300 mg initially, and 300 mg 1 hour later.
Malaria (prevention)	Oral, 100 mg (base)* once a day. Prophylaxis should begin 1 or 2 days before travel to the malarious area, be continued daily during travel, and for 4 weeks after traveler leaves the malarious area.
Nongonococcal urethritis caused by *C. trachomatis* or *U. urealyticum*	Oral, 100 mg (base)* two times a day for at least 7 days.
Syphilis, primary and secondary	Oral, 150 mg (base)* every 12 hours for at least 10 days. or IV infusion, 150 mg (base) every 12 hours for at least 10 days.
Uncomplicated urethral or endocervical infection caused by *C. trachomatis*	Oral, 100 mg (base)* two times a day for at least 7 days.

* *Note:* The dosing and strengths of dosage forms available are expressed in terms of doxycycline base (not salts).

Common Brand Names, Dosage Forms, and Strengths

Brand names available:
Amplidox; Apo-Doxy; Cadox; Clinofug 50; Clisemina; Cyclidox; Diksasil; Diocimex; Dorix; Doryx; Doxa; Doxi Film; Doximycin; Doxy; Doxy-Caps; Doxy-basan; Doxycin; Doxyclin; Doxyhexal; Doxylag; Doxylets; Doxylin; Doxymycin; Doxy-Tabs; Dumoxin; Duradoxal; Ecodox; Grodoxin; Hydramycin; Investin; Liomycin; Medomycin; Mespafin; Midoxin; Monodox; Monomycin; Neocyclin; Neodox; Nordox; Novodoxylin; Monodox; Roxyne; Rudocyclin; Servidoxyne; Supracyclin; Unidox; Vibracina; Vibra-Tabs; Vibramycin; Vibraveineuse; Wanmycin; Zadorin.

Generics may be available.

Doxycycline is available in the following dosage forms and strength(s):

Oral dosage forms—

Doxycycline For Oral Suspension USP: 25 mg (base) per 5 mL.
Doxycycline Calcium Oral Suspension USP: 50 mg (base) per 5 mL.
Doxycycline Hyclate Capsules USP: 50 and 100 mg (base).
Doxycycline Hyclate Delayed-Release Capsules USP: 100 mg (base).
Doxycycline Hyclate Tablets USP: 100 mg (base).

Injectable dosage form—

Doxycycline Hyclate For Injection USP: 100 and 200 mg (base).

Considerations Before Using

Precautions to Consider

- Pregnancy

Doxycycline crosses the placenta; **use is not recommended during the last half of pregnancy** since tetracyclines may cause permanent discoloration of teeth, incomplete development of enamel, and inhibition of skeletal growth in the fetus. In addition, fatty infiltration of the liver may occur in pregnant women, especially with high intravenous doses.

- Breastfeeding

Tetracyclines are distributed into breast milk; use is not recommended because of the possibility of their causing permanent staining of teeth, incomplete development of enamel, inhibition of skeletal growth, photosensitivity reactions, and oral and vaginal infections (thrush) in infants.

Drug Interactions and / or Related Problems

Doxycycline should not be administered to patients using the following medicines:

- Antacids
- Calcium supplements such as calcium carbonate
- Cholestyramine
- Choline and magnesium salicylates
- Colestipol
- Contraceptives, estrogen-containing, oral
- Iron supplements
- Laxatives, magnesium-containing
- Magnesium salicylate

Medical Considerations / Contraindications
No medical condition/contraindication of potential clinical significance has been selected for consideration prior to administration of doxycyclin.

Side / Adverse Effects

Medical attention is needed if any of the following side effects occurs:
- Benign intracranial hypertension (anorexia; headache; vomiting; visual changes)
- Hepatotoxicity (abdominal pain; nausea and vomiting; yellowing skin)
- Pancreatitis (abdominal pain; nausea and vomiting)
- Staining of teeth (in infants and children)

Medical attention may be needed if any of the following side effects continues or is bothersome:
- Central nervous system (CNS) toxicity (dizziness; lightheadedness; unsteadiness)
- Fungal overgrowth (itching of the rectal or genital areas; sore mouth or tongue)
- Gastrointestinal disturbances (cramps; burning in the stomach; diarrhea; nausea or vomiting)
- Hypertrophy of the papilla (darkened or discolored tongue)
- Photosensitivity (increase sensitivity of skin to sun)

Packaging and Storage

Oral dosage forms—

For Doxycycline For Oral Suspension USP and Doxycyclin Hyclate Delayed-Released Capsules USP—prior to reconstitution, store below 40 °C (104 °F), preferably between 15 and 30 °C (59 and 86 °F), unless otherwise specified by manufacturer. Store in a tight, light-resistant container.

For Doxycycline Calcium Oral Suspension USP—store below 40 °C (104 °F), preferably between 15 and 30 °C (59 and 86 °F), unless otherwise specified by manufacturer. Store in a tight, light-resistant container. Protect from freezing.

For Doxycycline Hyclate Capsules USP and Doxycycline Tablets USP—store below 40 °C (104 °F), preferably between 15 and 30 °C (59 and 86 °F), unless otherwise specified by the manufacturer. Store in a tight, light-resistant container.

Injectable dosage form—

For Doxycycline Hyclate For Injection USP—prior to reconstitution, store below 40 °C (104 °F), preferably between 15 and 30 °C (59 and 86 °F), unless otherwise specified by manufacturer. Protect from light.

Additional Information

For oral dosage forms:

- Doxycycline should be taken with a full glass of water. If gastric irritation occurs, doxycycline may be taken with milk, food, or carbonated beverages.
- Do not take within 1 to 3 hours of other medicines.

For injectable dosage form:

- Concentrations less than 100 micrograms (mcg) per mL or greater than 1 mg per mL are not recommended.
- Infusions should be administered over a 1- to 4-hour period of time. **Avoid rapid administration.**
- **Do not inject intramuscularly (IM) or subcutaneously (SC).**

Stability
After reconstitution, intravenous infusions of doxycycline hyclate retain their potency for 12 hours at room temperature or for 72 hours if refrigerated at concentrations of 100 mcg (0.1 mg) to 1 mg per mL in suitable fluids. Intravenous infusions of doxycycline hyclate retain their potency for 6 hours at room temperature at concentrations of 100 mcg (0.1 mg) to 1 mg per mL in lactated Ringer's injection or 5% dextrose and lactated Ringer's injection.
Infusions must be protected from direct sunlight during administration.

If frozen immediately after reconstitution with sterile water for injection, solutions at concentrations of 10 mg per mL retain their potency up to 8 weeks at –20 °C (–4 °F). Once thawed, solutions should not be refrozen.

Ergometrine

Ergometrine belongs to the ergot alkaloids group. Ergometrine stimulates the uterine muscle to increase force and frequency of contractions.

Indications

Ergometrine is indicated in the prevention and treatment of postpartum or postabortal hemorrhage (bleeding) due to uterine atony (lack of strength).

In case of incomplete abortion, ergometrine may be used to hasten the expulsion of uterine contents. The use of ergometrine is not recommended prior to delivery of the placenta since placenta entrapment may occur.

Note: Ergometrine is not indicated for induction and augmentation of labor, to induce abortion, or in cases of threatened spontaneous abortion because it may produce nonphysiologic, tetanic contractions and it has a long duration of action.

Table of Indications and Doses

Indication	Adult Dose
Uterine stimulant	Intravenous, administered over at least 1 minute, or intramuscular, 200 mcg (0.2 mg), repeated in 2 to 4 hours if necessary, up to five doses; or, oral or sublingual, 200 to 400 mcg (0.2 to 0.4 mg) two to four times a day until the danger of uterine atony or hemorrhage has passed.

Note: An oral or sublingual administration usually follows an initial injected dose. Generally a treatment course of 48 hours is sufficient.

Common Brand Names, Dosage Forms, and Strengths

Brand names available:
Ergotrate Maleate; Ermalate; Ermetrine; Metriclavin; Panergal; Secalysat-EM; Secometrin.

Generics may be available.

Ergometrine is available in the following dosage forms and strength:

Oral dosage forms—
- Ergometrine Maleate Tablets USP: 200 mcg (0.2 mg).

Injectable dosage forms—
- Ergometrine Maleate Injection USP: 200 mcg (0.2 mg) per mL.

Considerations Before Using

Precautions to Consider

- Pregnancy:

Use of ergometrine is contraindicated during pregnancy. Tetanic contractions may result in decreased uterine blood flow and fetal distress.

- Labor and delivery

High doses of ergometrine administered prior to delivery may cause uterine tetany and problems in the infant. **Ergometrine should not be administered prior to delivery of the placenta.** Administration prior to the delivery of the placenta may cause captivation of the placenta or missed diagnosis of a second infant, due to excessive uterine contraction.

- Breastfeeding

Problems in humans have not been documented. However, ergot alkaloids are excreted into breast milk. Although inhibition of lactation has not been reported for ergometrine, other ergot alkaloids inhibit lactation. Lactation may be delayed or diminished with prolonged use.

Medical Considerations / Contraindications

Except under special circumstances, this medication should not be used when the following medical problems exist*:*

- Coronary artery disease
- Eclampsia or pre-eclampsia (hypertension; convulsions during pregnancy)
- Occlusive peripheral vascular disease or Raynaud's phenomenon, severe

Risk-benefit should be considered when the following medical problems exist*:*

- Allergy, hypersensitivity, or intolerance to ergometrine or other ergot alkaloids
- Cardiovascular disease or coronary artery disease, or mitral valve stenosis, or venoatrial shunts
- Electrocardiograph abnormalities such as ST changes during exercise or episodes of chest pain or prolonged QT interval (atrioventricular block) during chest pain, rest or activity
- Hepatic function impairment
- Positive response to ergometrine testing, history of
- Renal function impairment
- Sepsis

Side / Adverse Effects

Medical attention is needed if any of the following side effects occurs:

- Allergic reaction, including shock
- Bradycardia (slow heartbeat)
- Cardiac arrest or ventricular arrhythmias, including fibrillation and tachycardia (irregular heartbeat)
- Coronary vasospasm (chest pain)
- Dyspnea (unexplained shortness of breath)
- Hypertension, sudden and severe (sudden and severe headache; blurred vision; seizures)

- Myocardial infarction (crushing chest pain, unexplained shortness of breath)
- Peripheral vasospasm (itching of skin; pain in arms, legs, or lower back; pale or cold hands or feet; weakness in legs)

Medical attention is needed if any of the following signs continues or is bothersome:

- Abdominal, stomach pain
- Diarrhea
- Dizziness
- Headache, mild and transient
- Nasal congestion
- Nausea
- Sweating
- Tinnitus (ringing in the ears)
- Unpleasant taste
- Uterine cramping
- Vomiting

Packaging and Storage

Oral dosage forms—

For Ergometrine Maleate Tablets USP—store below 40 °C (104 °F), preferably between 15 and 30 °C (59 and 86 °F), unless otherwise specified by manufacturer. Store in well-closed container.

Injectable dosage forms—

For Ergometrine Maleate Injection USP—store below 8 °C (46 °F), preferably in between 2 and 8 °C (36 and 46 °F), unless otherwise specified by manufacturer. Protect from light. Protect from freezing.

Additional Information

- Antiemetic (antivomiting) medications such as prochlorperazine may be administered prior to use of ergometrine

- Because the risk of severe adverse effects is increased with intravenous administration of ergometrine, its use is recommended only for emergencies such as excessive uterine bleeding. **Intravenous administration must be done slowly, over a period of at least 1 minute**. Some clinicians recommend dilution of the solution before administration.

- In some patients who do not respond to ergometrine because of hypocalcemia, cautious intravenous administration of calcium gluconate may restore the oxytocic action.

Stability

Ergometrine maleate ampules may be stored at room temperature for up to 60 days. At any time, discolored solutions or solutions containing visible particles should not be used.

Erythromycins

Erythromycins are antibacterial agents. They are broad-spectrum antibiotics with activity against gram-positive and gram-negative bacteria and other infectious agents, including *Chlamydia trachomatis,* mycoplasmas (*Mycoplasma pneumoniae* and *Ureaplasma urealyticum*), and spirochetes (*Treponema pallidum* and *Borrelia* species).

Erythromycin base and salts have similar activities, but different salts are used in different dosage forms. The use of **erythromycin estolate** has been associated with hepatotoxicity in pregnant women and is **not recommended during pregnancy.**

Indications

Erythromycins are indicated in the treatment of endocervical and urethral chlamydial infections caused by *C. trachomatis*, endocervical or urethral gonorrhea caused by *Neisseria gonorrhoeae,* syphilis caused by *T. pallidum* in penicillin-allergic patients, and nongonococcal urethritis caused by *C. trachomatis* and *U. urealyticum*.

Table of Indications and Doses

Indication	Adult Dose
Chlamydial infections, endocervical and urethral	Oral, 333 mg (base)* every 8 hours, or 500 mg every 6 hours for 7 days; or 250 mg every 6 hours for 14 days.
Pelvic inflammatory disease, caused by *N. gonorrhoeae*	Oral, 250 mg (base)* every 6 hours for 7 days, after intravenous administration of erythromycin 500 mg every 6 hours for 3 days.
Syphilis, primary	Oral, 30 to 40 grams (base)* over a 10- to 15-day period.
Urethritis, nongonococcal	Oral, 500 mg every 6 hours for 7 days; or 250 mg every 6 hours for 14 days.

**Note:* The dosing and strengths of erythromycins available are expressed in terms of erythromycin base.

Common Brand Names, Dosage Forms, and Strengths

Brand names available:
Abboticine; Apo-Erythro ES; Basebiotic; Bristamycin; E-base; EES; E-Mycin; Eramycin; Erios; Erithrocina; Eritrolag; Erostin; Ery-Max; Ery-Tab; Erybid; ERYC; Eryprim; Erythro-500; Erythro-Teva; Erythrocin; Erythromid; Ethril; Evesin; Frapsin; Ilotycin; Ilosone; Lorecyn; Minotin; Monomycin; Novo-rythro; Pantomicina; PCE; Pfizer-E; Staticin; Stiemycin; Winthrocin.

Generics may be available.

Erythromycins are available in the following dosage forms and strengths:

Oral dosage forms—

Erythromycin Delayed-Release Capsules USP: 250 mg (base), and 333 mg (base).
Erythromycin Tablets USP: 250 mg (base) and 500 mg (base).
Erythromycin Delayed-Release Tablets USP: 250 mg (base), 333 mg (base), and 500 mg (base).
Erythromycin Ethylsuccinate Oral Suspension USP: 200 mg per 5 mL and 400 mg per 5 mL.
Erythromycin Ethylsuccinate for Oral Suspension USP: 100 mg, 200 mg, and 400 mg per 5 mL (when reconstituted according to manufacturer's instructions).
Erythromycin Ethylsuccinate Tablets USP: 400 and 600 mg.
Erythromycin Ethylsuccinate Tablets USP (chewable): 200 mg and 400 mg.
Erythromycin Stearate Oral Suspension: 125 mg (base) per 5 mL and 250 mg (base) per 5 mL.
Erythromycin Stearate Tablets USP: 250 mg (base) and 500 mg (base).

Injectable dosage forms—
Sterile Erythromycin Gluceptate USP: 500 mg (base) and 1 gram (base).
Erythromycin Lactobionate for Injection USP: 500 mg (base) and 1 gram (base) per vial.

Considerations Before Using

Precautions to Consider

- Pregnancy

Erythromycins cross the placenta, resulting in low fetal plasma concentrations. However, erythromycin estolate has been associated with an increased risk of reversible, subclinical hepatotoxicity in approximately 10% of pregnant women; its use during pregnancy is not recommended. However, problems with other erythromycins have not been documented.

- Breastfeeding

Erythromycins are distributed into breast milk. However, problems in humans have not been documented.

Drug Interactions and / or Related Problems

Erythromycins should not be administered to patients using any of the following medicines:

- Alfentanil
- Astemizole
- Carbamazepine
- Chloramphenicol
- Cyclosporine
- Hepatotoxic medications, other
- Lincomycins
- Terfenadine
- Warfarin
- Xanthines, such as aminophylline, caffeine, oxtriphylline, and theophylline

Medical Considerations / Contraindications

Risk-benefit should be considered when the following medical problems exist:

- Cardiac arrhythmias, history of, or QT prolongation
- Liver disease

Side / Adverse Effects

Medical attention is needed if any of the following side effects occurs:

- Cardiac toxicity, especially QT prolongation and torsades de pointes (irregular or slow heart rate; recurrent fainting; sudden death)
- Hepatotoxicity (fever; nausea; skin rash; stomach pain, severe; unusual tiredness or weakness; yellow eyes or skin; vomiting)
- Hypersensitivity (skin rash, redness, or itching)
- Inflammation or phlebitis at site of injection
- Loss of hearing, usually reversible
- Pancreatitis (severe abdominal pain, nausea, and vomiting)

Medical attention may be needed if any of the following side effects continues or is bothersome:

- Gastrointestinal disturbances (abdominal or stomach cramping and discomfort; diarrhea, nausea, or vomiting)
- Oral candidiasis (sore mouth or tongue; white patches in mouth and/or on tongue)
- Vaginal candidiasis (vaginal itching and discharge)

Packaging and Storage

Oral dosage forms—

For capsules, delayed-release capsules, tablets, or chewable tablets—store below 40 °C (104 °F), preferably between 15 and 30 °C (59 and 86 °F), unless otherwise specified by the manufacturer. Store in a tight container.

For Erythromycin Ethylsuccinate Oral Suspension USP—store between 2 and 8 °C (36 and 46 °F). Store in a tight container.

For Erythromycin Ethylsuccinate for Oral Suspension USP (prior to reconstitution) and Erythromycin Stearate Oral Suspension—store below 40 °C (104 °F), preferably between 15 and 30 °C (59 and 86 °F), unless otherwise specified by the manufacturer. Store in a tight container.
Note: After reconstitution, Erythromycin Ethylsuccinate for Oral Suspension USP, depending on manufacturer or specific product, does not require refrigeration if used within 14 days.

Injectable dosage forms—

Prior to reconstitution, store below 40 °C (104 °F), preferably between 15 and 30 °C (59 and 86 °F), unless otherwise specified by the manufacturer.

Additional Information

- Erythromycin delayed-release tablets should be swallowed whole.

- Erythromycin delayed-release capsules contain enteric-coated pellets. The entire contents of a capsule may be sprinkled on applesauce, jelly, or ice cream immediately prior to ingestion.

- Erythromycin film-coated tablets (base and stearate) are best absorbed on an empty stomach; however, if gastrointestinal irritation occurs, they may be taken with food. Enteric-coated erythromycin base may be taken without regard to meals; and erythromycin ethylsuccinate is better absorbed when taken with meals.

Folic Acid

Folic acid is a nutritional supplement (Vitamin B_9). Folic acid deficiency may lead to megaloblastic and macrocytic anemia and glossitis (inflammation of the tongue).

Indications

Folic acid is indicated for the prevention and treatment of folic acid deficiency states that may occur as a result of inadequate nutrition or intestinal malabsorption.

Recommended intakes for all vitamins and most minerals are increased during pregnancy.

Table of Indications and Doses

Recommended daily dietary intakes for folic acid are defined differently worldwide.
For folic acid, daily recommended intake is generally defined as follows:

Persons	**U.S. (mcg)**	**Canada (mcg)**	**FAO/WHO Recommended Daily Doses (mcg)***
Adolescent and adult females	150 to 180	145 to 190	170
Pregnant females	400	445 to 475	370 to 470
Breastfeeding females	260 to 280	245 to 275	270

**Note:* Requirements of vitamin A, iron, folate, and vitamin B_{12}. Report of a Joint Food and Agriculture Organization/World Health Organization Expert Consultation. Rome: Food and Agriculture Organization of the United Nations,1988.

Indication	**Dose**
Deficiency (prophylaxis)	Oral, amount based on normal daily recommended intakes.
Deficiency (treatment)	Dose is individualized based on severity of deficiency.

Common Brand Names, Dosage Forms, and Strengths

Brand names available:
Apo-Folic; Folvite; Novo-Folacid.

Generics may be available.

Folic acid may be available in the following dosage forms and strengths:
Oral dosage form—
Folic Acid Tablets USP: 0.1 mg, 0.4 mg, 0.8 mg, 1 mg, and 5 mg.

Injectable dosage form—
Folic Acid Injection USP: 5 mg (base) and 10 mg (base) per mL.

Considerations Before Using

Precautions to Consider

- Pregnancy

Problems in humans have not been documented with intake of normal daily recommended amounts. Folic acid crosses the placenta. However, adequate and well-controlled studies in humans have not shown that folic acid causes adverse effects in the fetus.

Some studies have found that folic acid supplementation alone or in combination with other vitamins given before conception and during early pregnancy may reduce the incidence of neural tube defects in infants.

- Breastfeeding

Folic acid is distributed into breast milk. However, problems in humans have not been documented with intake of normal daily recommended amounts.

Medical Considerations / Contraindications

Risk-benefit should be considered when the following medical problem exists:

- Pernicious anemia

Side / Adverse Effects

Medical attention is needed if any of the following side effects occurs:

- Allergic reactions such as:
  - Bronchospasm (shortness of breath; troubled breathing; tightness of chest; wheezing)
  - Erythema (redness of skin)
  - Fever
  - Skin rash or itching

Packaging and Storage

For Folic Acid Tablets USP—store below 40 °C (104 °F), preferably between 15 and 30 °C (59 and 86 °F), unless otherwise specified by the manufacturer. Store in a well-closed container.

For Folic Acid Injection USP—store below 40 °C (104 °F), preferably between 15 and 30 °C (59 and 86 °F), unless otherwise specified by the manufacturer. Protect from light. Protect from freezing.

Additional Information

- Because of the infrequency of single B vitamin deficiencies, combinations are commonly administered.

- In most cases, injectable administration is indicated only when oral administration is not acceptable (for example, in nausea, vomiting, pre- and postoperative conditions) or possible (for example, in malabsorption syndromes).

Gentamicin

Gentamicin is an antibacterial agent belonging to the aminoglycosides group. Aminoglycosides are usually active against most Enterobacteriaceae, including *Escherichia coli, Proteus mirabilis,* indole-positive *Proteus, Citrobacter*, *Enterobacter, Klebsiella, Providencia*, and *Serratia* species. *Acinobacter* and *Pseudomonas* species are also usually susceptible. Aminoglycosides are used concurrently with antipseudomanal penicillins or certain cephalosporins in the treatment of serious *Pseudomonas aeruginosa* infections. Bacterial resistances to gentamicin are usually common to all aminoglycosides except amikacin.

Indications

Gentamicin is indicated in the treatment of serious infections such as bacterial septicemia caused by susceptible organisms. It may be used also in the treatment of urinary tract infections (recurrent or complicated) caused by susceptible organisms.

Table of Indications and Doses

Indication	Adult Dose*	Infant Dose
Antibacterial (systemic)	Intramuscular (IM) or intravenous infusion (IV), 1 to 1.7 mg (base)** per kg of body weight every 8 hours for 7 to 10 days or more. Up to 8 mg (base) per kg of body weight daily, in severe to life-threatening infections.	Premature and full-term neonates up to 1 week of age: IM or IV infusion, 2.5 mg (base) per kg of body weight, every 12 to 24 hours for 7 to 10 days or more. Older neonate and infants: 2.5 mg (base) per kg of body weight, every 8 to 16 hours for 7 to 10 days or more.

**Note:* Because of the low therapeutic index of amino-glycosides, it is best to base dosage calculations on ideal body weight (IBW) as follows:

IBW (males)= 50 kg + (2.3 kg x inches over 5 feet)
IBW (females)= 45 kg + (2.3 kg x inches over 5 feet)

**The dosing and strengths of dosage forms available are expressed in terms of gentamicin base (not salts).

Common Brand Names, Dosage Forms, and Strengths

Brand names available:
Amplomicina; Apogen; Biogen; Biomargen; Bristagen; Cidomycin; Dispagent; Duragentam; Espectrocina; Garamycin; Garatec; Gensumycin; Genta; Gentabac; Gentabilles; Gentacidin; Gentadavur; Gentafair; Genta-Gobens; Gentak; Gentallenas; Gentalline; Gentallorens; Gentalyn; Gentamedical; Gentamen; Gentamicin-POS; Gentamin; Gentamina; Gentamival; Gentamix; Gentamorgens; Gentamytrex; Gentaplus; Gentaroger; Gentasillin; Gentatrim; Genticin; Genticina; Genticol; Gentisum; Gento; Gentobic; Gentofarma; Gentogram; Gentoma; Gentralay; Geomycine; Getamisin; Gevramycin; G-Mycin; Glevomicina; Hexamycin; Hosbogen; Jenamycin; Lugacin; Marcogen; Metrorrigen; Miramycin; Nichogencin; Nuclogen; Pargenta; Plurisemina; Quintamicina; Refobacin; Rexgenta; Ribomicin; R.O.-Gentycin; Rupengen; Septopal; Servigenta; Sulgemicin; Sulmycin; Supragenta; Tamadit.

Generics may be available.

Gentamicin is available in the following dosage forms and strengths:

Injectable dosage forms—

Gentamicin Sulfate Injection USP: 10 and 40 mg (base) per mL.
Gentamicin Sulfate In Sodium Chloride Injection:
40, 60, 70, 80, and 100 mg (base) in 50 mL, and
40, 60, 80, 90, 100, 120, 160, and 180 mg (base) in 100 mL.

Considerations Before UsIng

Precautions to Consider

- Pregnancy

Gentamicin crosses the placenta and may be nephrotoxic to the human fetus. Adequate and well-controlled studies in humans have not been done. Since other aminoglycosides have been reported to cause deafness in the fetus, risk-benefit must be carefully considered when this medication is required in life-threatening situations or in serious diseases for which other medications cannot be used or are ineffective.

- Breastfeeding

Gentamicin is excreted in breast milk in small amounts. However, aminoglycosides are poorly absorbed from the gastrointestinal tract and problems in nursing infants have not been documented.

- Pediatrics

All amino-glycosides have the potency to cause neuromuscular blockade. Gentamicin should be used with caution in premature infants and neonates because of patients' immature renal capability, which may result in prolonged elimination half-life and aminoglycosides-induced toxicity. Dosage adjustment may be required in pediatric patients.

Drug Interactions and / or Related Problems

Gentamicin should not be administered to patients using the following:

- Aminoglycosides, two or more concurrently
- Capreomycin
- Methoxyflurane
- Nephrotoxic medications
- Neuromuscular blocking agents or medications with neuromuscular blocking activity, including halogenated hydrocarbon inhalation anesthetics, opioid analgesics, and massive transfusions with citrate anticoagulated blood
- Ototoxic medications
- Polymyxins, injectable

Medical Considerations / Contraindications

Risk-benefit should be considered when the following medical problems exist:

- Botulism in infant (food poisoning caused by *C. botulinum*)
- Eighth-cranial-nerve impairment
- Myasthenia gravis
- Parkinsonism
- Previous allergy to aminoglycosides
- Renal function impairment

Side / Adverse Effects

Medical attention is needed if any of the following side effects occurs:

- Hypersensitivity (skin rash, redness, itching, or swelling)
- Nephrotoxicity (greatly increased or decreased frequency of urination or amount of urine; increased thirst; loss of appetite; nausea; vomiting)
- Neuromuscular blockade (difficulty in breathing; drowsiness; weakness)
- Neurotoxicity (muscle twitching; numbness; seizures; tingling)
- Ototoxicity, auditory (any loss of hearing; ringing or buzzing; or a feeling of fullness in the ears)
- Ototoxicity, vestibular (clumsiness; dizziness; nausea; vomiting; unsteadiness)
- Peripheral neuritis (burning of face or mouth; numbness; tingling)

Medical attention may be needed if any of the following side effects occurs and/or progresses after the medication is discontinued:

- Any loss of hearing; ringing or buzzing or a feeling of fullness in the ears
- Clumsiness or unsteadiness
- Dizziness
- Greatly increased or decreased frequency of urination or amount of urine; increased thirst; loss of appetite; nausea or vomiting

Overdose

Treatment for overdose:

- Specific treatment—
    - Hemodialysis or peritoneal dialysis to remove aminoglycosides from the blood of patients with impaired renal function.

    - Anticholinesterase agents, calcium salts, or mechanical respiratory assistance to treat neuromuscular blockade, resulting in prolonged skeletal muscle weakness and respiratory depression or paralysis (apnea), that may occur when two or more aminoglycosides are given concurrently.

- Supportive care—Treatment of aminoglycosides overdose or toxic reactions should be symptomatic and supportive.

Packaging and Storage

For Gentamicin Sulfate Injection USP—store below 40 °C (104 °F), preferably between 15 and 30 °C (59 and 86 °F), unless otherwise specified by the manufacturer. Protect from freezing.

For Gentamicin Sulfate In Sodium Chloride Injection—store between 2 and 30 °C (36 and 86 °F), unless otherwise specified by the manufacturer. Protect from freezing.

Additional Information

- Obstetrical patients receiving gentamicin dose adjusted on the basis of serum concentrations may require less than minimum recommended dose or greater than the maximum recommended dose of gentamicin because of wide individual variability.

- Subcutaneous administration is not recommended and can be painful.

- Gentamicin Sulfate Injection may also be administered as an aerosol nebulization.

- The sodium content of the injection dosage form is approximately 19.4 mEq (450 mg) per 50 mL. This must be considered for patients on restricted sodium intake

Incompatibilities
Administering amino-glycosides and penicillins concurrently may result in mutual inactivation. If these two groups are to be administered concurrently, they should be administered in different sites at least 1 hour apart. **Do not mix amino-glycosides and penicillins in the same intravenous bag, bottle, or tubing.**

Stability
- Do not use if injection is discolored or contains precipitate.

- Commercially available gentamicin piggyback injections require no further dilution prior to administration. Since these injections contain *no preservatives*, they should be used promptly after being opened; unused portion should be discarded.

Iron Supplements (Ferrous Salts)

Iron supplements are antianemic agents. Iron is an essential component in the physiological formation of hemoglobin, adequate amounts of which are necessary for effective erythropoiesis (production of red blood cells) and the resultant oxygen transport capacity of the blood.

Iron also serves as a cofactor of several essential enzymes. Iron is necessary for catecholamine metabolism and proper functioning of neutrophils (white blood cells).

Indications

Iron supplements are indicated in the prevention and treatment of iron deficiency anemia, which may result from inadequate diet, malabsorption, pregnancy, rapid growth during childhood, and/or blood loss.

Note: The cause of iron deficiency states should always be determined, as it may relate to a serious condition.

Deficiency in iron may lead to fatigue, shortness of breath, decreased physical performance, impaired learning in children and adults, altered body temperature, and altered immune function.

The most important pathologic causes of blood loss in developing countries are parasitic infections (hookworm [*Necator americanus* and *Ancylostoma duodenale*] or whipworm [*Trichuris trichiura*]).

Tables of Indications and Doses

Recommended dietary intakes for iron are defined differently worldwide.

Note: The Report of a Joint Food and Agriculture Organization/World Health Organization Expert Consultation separates three typical categories of meals in the various regions of the world: “low,” “intermediate,” and “high” bio-availability.

For the definition of the requirement levels, the FAO/WHO report used two types of requirements: The basal requirement (amount of dietary iron required to maintain a normal supply of iron to tissues and preserve all clinically detectable functions) and the requirement to prevent anemia (level of dietary iron intake needed to prevent a fall in hemoglobin to levels below the cut-off points; 130 g per liter [L] for men, 120 g per L for women, 110 g per L for pregnant women).

For elemental iron, daily recommended intake is generally defined as follows:

Persons	U.S	Canada	FAO/WHO *	
			Low bio-availability diet	High bio-availability diet
Adolescent and adult females	10 to 15 mg	8 to 13 mg	48[1] to 29[2] mg	16[1] to 10[2] mg
Pregnant females	30 mg	17 to 22 mg	[3]	[3]
Breastfeeding females	15 mg	8 to 13 mg	26[1] to 17[2] mg	9[1] to 6[2] mg

**Note:* Requirements of vitamin A, iron, folate, and vitamin B_{12}. Report of a Joint FAO/WHO Expert Consultation. Rome: Food and Agricultural Organization of the United Nations, 1988.

[1] Basal requirement

[2] Requirement to prevent anemia

[3] For pregnant women, iron needs increase from 0.8 mg per day during the first trimester to 4.4 mg per day during the second trimester, and to 6.3 mg per day during the third trimester.

The American Academy of Pediatrics recommends that breastfed preterm infants 2 months of age and older receive 2 to 3 mg per kg of body weight (mg/kg) a day of elemental iron in the form of ferrous sulfate. Full-term infants 4 months of age and older should receive 1 mg/kg a day of elemental iron, preferably from iron-fortified formula or cereal.

Indication	Dose
Iron deficiency (prophylaxis)	Oral, amount based on daily recommended intakes of elemental iron.
Iron deficiency (treatment)	Treatment dose is individualized based on severity of deficiency.

Common Brand Names, Dosage Forms, and Strengths

Brand names available:
For Ferrous Fumarate: Femiron; Feostat Drops; Ferretts; Ferrolina; Ferronat; Ferrone; Ferro-Sequels; Ferrum Hausmann; Fersaday; Fersamal; Ferumat; Firon; Fumafer; Fumasorb; Fumerin; Fumiron; Hematon; Hemocyte; Hemoton; Ircon; Maniron; Neo-Fer; Nephro-Fer; Novofumar; Palafer; Span-FF; Tolferain; Tolifer; Ultra Fe.

Generics may be available.

For Ferrous Gluconate: Apo-Ferrous Gluconate; Cerevon; FeG Iron; Fergon; Fergutin; Ferralet; Ferralet Slow Release; Ferrominerase; Ferronicum; Fertinic; Glucohaem; Haemex-G; Hierro Liquefal; Imperon; Losfer; Losferron; Novoferrogluc; Roosferro; Simron.

Generics may be available.

For Ferrous Sulfate: Aktiferrin; Apo-Ferrous Sulfate; Biotonetten; Conferon; Duroferon; Eryfer; Femas; Feosofor; Feosol; Feospan; Fer-gen-sol; Fer-in-Sol; Fer-Iron; Feratab; Feritard; Ferograd; Ferrospace; Ferralyn; Ferra-TD; Ferro-Grad; Ferro-Gradumet; Ferromex; Ferrosan; Ferrostatin; Fesofer; Fespan; Haemex-S; Haemofort; Irosul; Liquifer; Microfer; Minifer; Mol-Iron; Novoferrosulfa; Orafer; PMS-Ferrous Sulfate; Resoferon; Resoptifer; Slow Fe; Sorbifer; Tardofer; Tardyferon; Vitaferro.

Generics may be available.

Ferrous salts are available in the following dosage forms and strengths:

Oral dosage forms—

Ferrous Fumarate Capsules: 300 mg (100 mg of elemental iron).
Ferrous Fumarate Extended-Release Capsules: 325 mg (106 mg of elemental iron).
Ferrous Fumarate Oral solution: 45 mg (15 mg of elemental iron) per 0.6 mL.
Ferrous Fumarate Oral Suspension: 100 mg (33 mg of elemental iron) per mL, 300 mg (100 mg of elemental iron) per 5 mL.
Ferrous Fumarate Tablets USP: 63, 195, 200, 300, 325, and 350 mg (respectively, 20, 64, 66, 99, 106, and 115 mg of elemental iron).
Ferrous Fumarate Chewable Tablets: 100 mg (33 mg of elemental iron).

Ferrous Gluconate Capsules USP: 86 mg (10 mg of elemental iron).
Ferrous Gluconate Elixir USP: 300 mg (34 mg of elemental iron) per 5 mL.
Ferrous Gluconate Syrup: 300 mg (35 mg of elemental iron) per 5 mL.
Ferrous Gluconate Tablets USP: 300, 320, and 325 mg (respectively, 35, 37, and 38 mg of elemental iron).
Ferrous Gluconate Extended-Release Tablets: 320 mg (37 mg of elemental iron).

Ferrous Sulfate Capsules: 250 mg (50 mg of elemental iron).
Ferrous Sulfate (Dried) Capsules: 190 mg (60 mg of elemental iron).
Ferrous Sulfate Extended-Release Capsules: 150, 159, (Dried) / and 250 mg (respectively, 30, 50, and 50 mg of elemental iron).
Ferrous Sulfate Elixir: 220 mg (44 mg of elemental iron) per 5 mL.
Ferrous Sulfate Oral Solution USP: 75 mg (15 mg of elemental iron) per 0.6 mL, 90 mg (18 mg of elemental iron) per 5 mL, 125 mg (25 mg of elemental iron) per mL, 150 mg (30 mg of elemental iron) per 5 mL, and 300 mg (60 mg of elemental iron) per 5 mL.
Ferrous Sulfate Tablets USP: 195, 300, and 325 mg (respectively, 39, 60, and 65 mg of elemental iron).
Ferrous Sulfate Tablets (Dried) USP: 200 mg (65 mg of elemental iron).
Ferrous Sulfate Enteric-Coated Tablets: 300, and 325 mg (respectively 60 and 65 mg of elemental iron).
Ferrous Sulfate Extended-Release Tablets: 325 and 525 mg (respectively 65 and 105 mg of elemental iron).
Ferrous Sulfate (Dried) Extended-Release Tablets: 160 mg (50 mg of elemental iron).

Considerations Before Using

Precautions to Consider

- Pregnancy

Studies in humans have not been done, and problems in humans have not been documented with intake of normal daily recommended amounts.

During the second and third trimesters of pregnancy, the need for iron is greatly increased and iron supplements may be recommended.

- Breastfeeding

Problems in humans have not been documented with intake of normal daily recommended amounts.

Drug Interactions and / or Related Problems

Ferrous salts should not be administered to patients using—

- Acetohydroxamic acid
- Antacids
- Dimercaprol
- Etidronate
- Fluoroquinolones
- Tetracyclines, oral

Medical Considerations / Contraindications

Except under special circumstances, this medication should not be used when the following medical problems exist:

- Hemochromatosis
- Hemosiderosis
- Other anemic conditions, unless accompanied by iron deficiency
- Porphyria cutanea tarda

Risk-benefit should be considered when the following medical problem exists:

- Caution is recommended in patients receiving repeated blood transfusions because of the risk of iron overload.

Side / Adverse Effects

Medical attention is needed if any of the following side effects occurs:

- Abdominal or stomach pain, cramping, or soreness
- Contact irritation (chest or throat pain, especially when swallowing; stools containing fresh or digested blood)

Medical attention may be needed if any of the following side effects continues or is bothersome:

- Constipation
- Darkened urine
- Diarrhea
- Heartburn

- Nausea
- Staining of teeth (with liquid dosage forms)
- Vomiting

Overdose

Acute toxicity, ranging from vomiting to coma, has been reported with ingestion of 200 to 250 mg per kg of body weight (mg/kg) of ferrous sulfate in adults.

Overdose of ingested iron can be fatal. Immediate treatment is essential.

Clinical effects of overdose:

- Early symptoms of acute toxicity include diarrhea, sometimes containing blood; fever; nausea, severe; stomach pain or cramping, sharp; vomiting, severe, sometimes with blood.

  Note: A latency period lasting from 2 to about 48 hours after ingestion may occur between the two symptomatic phases. During this time patient may appear to improve clinically.

- Late symptoms of acute toxicity include bluish colored lips, fingernails, palms of hands; drowsiness; pale, clammy skin; seizures; unusual tiredness or weakness; weak and fast heartbeat.

  Note: Late signs may also include metabolic acidosis, hypotension, hypoglycemia, hepatic injury or failure, cardiovascular collapse, and gastrointestinal scarring.

Treatment of the overdose:

- To decrease absorption: Inducing vomiting with ipecac syrup or lavaging with sodium bicarbonate (if patient is comatose or having convulsions) may be used, depending on the patient's condition.

- Specific treatment:
  - Fluid and electrolyte balance must be maintained. Acidosis may be corrected with intravenous sodium bicarbonate.

  - Antidote: Deferoxamine, administered slowly, intravenously or intramuscularly, is used in more severe iron toxicity, when symptoms are other than minimal vomiting or diarrhea. Deferoxamine chelates iron to form a red soluble ferric complex (ferrioxamine) that is excreted in the urine. Avoid deferoxamine in patients who have developed renal failure.

  - Dialysis is of no value to remove serum iron alone, but it may be used to increase excretion of the iron-deferoxamine complex, and is indicated in the presence of anuria or oliguria (suppression or decrease of urine output).

  - Exchange transfusion may be successful.

- Supportive care: Patients must be observed for a minimum of 24 hours after becoming asymptomatic. Delayed effects may include shock and severe gastrointestinal bleeding (24 to 48 hours) and gastrointestinal obstruction (weeks to months).

Packaging and Storage

For ferrous fumarate, ferrous gluconate, and ferrous sulfate solid oral dosage forms—store below 40 °C (104 °F), preferably between 15 and 30 °C (59 and 86 °F), in a tight container, unless otherwise specified by the manufacturer.

For Ferrous Fumarate Oral Solution, Ferrous Fumarate Oral Suspension, and Ferrous Sulfate Elixir—store below 40 °C (104 °F), preferably between 15 and 30 °C (59 and 86 °F), in tight container, unless otherwise specified by the manufacturer. Protect from freezing.

For Ferrous Gluconate Elixir USP, Ferrous Gluconate Syrup, and Ferrous Sulfate Oral Solution USP—store below 40 °C (104 °F), preferably between 15 and 30 °C (59 and 86 °F), in tight container, unless otherwise specified by the manufacturer. Protect from light. Protect from freezing.

Additional Information

- Absorption of iron is most effective when the iron is ingested on an empty stomach; taking it with food will decrease absorption but will also lessen the chance of gastrointestinal irritation.

- Taking iron supplements 1 hour before or 2 hours after eating dairy products, eggs, coffee, tea, or whole-grain breads and cereals will prevent the formation of less soluble and insoluble complexes, which decrease iron absorption.

- Concurrent use of ascorbic acid with iron in proper ratio (over 200 mg of ascorbic acid to 30 mg of elemental iron) is thought to enhance iron absorption.

Ketamine

Ketamine is a general anesthetic agent.

Indications

Ketamine is indicated to provide anesthesia for short diagnostic and surgical procedures that do not require skeletal muscle relaxation. It is also indicated to induce anesthesia prior to administration of other general anesthetics.

In subhypnotic doses, ketamine produces a dissociative state. The patient does not appear to be asleep and experiences a feeling of being dissociated from the environment.

Table of Indications and Doses

Indication	**Adult Dose**
General anesthesia, induction of	Intravenous (IV), 1 to 2 mg (base)* per kg of body weight, administered as a single dose or by intravenous infusion at a rate of 0.5 mg (base) per kg of body weight per minute up to 4.5 mg (base) per kg of body weight (IV); or Intramuscular (IM), 5 to 10 mg (base) per kg of body weight up to 13 mg (base) per kg of body weight.
General anesthesia, maintenance of	IV, 0.01 to 0.05 mg (base)* per kg of body weight by continuous infusion at a rate of 1 to 2 mg per minute.

Note: The dosages are intended as a guideline. Actual dosage must be individualized to meet the needs of each patient.

*The dosing and strengths of dosage forms available are expressed in terms of ketamine base (not hydrochloride salt).

Common Brand Names, Dosage Forms, and Strengths

Brand names available:
Calypsol; Ketaject; Ketalar; Ketanest; Ketaset; Ketolar; Narkamon; Velonarcon.

Generics may be available.

Ketamine is available in the following dosage form and strengths:

Injectable dosage form—

Ketamine Hydrochloride Injection USP: 10 mg (base) per mL, 50 mg (base) per mL, and 100 mg (base) per mL.

Considerations Before Using

Precautions to Consider

- Pregnancy

Ketamine crosses the placenta. However, it has been used in low doses to provide obstetrical anesthesia and has not been shown to cause adverse effects.

- Breastfeeding

Problems in humans have not been documented.

Medical Considerations / Contraindications

Except under special circumstances, this medication should not be used when the following medical problems exist:

- Any condition in which a significant elevation of blood pressure would be hazardous, such as—
  - Cardiovascular disease, severe
  - Heart failure
  - Hypertension, severe or poorly controlled
  - Myocardial infarction, recent
  - Stroke, history of
- Cerebral trauma
- Intracerebral mass or hemorrhage

Risk-benefit should be considered when the following medical problems exist:

- Eye injury, open globe
- Increased cerebrospinal fluid (CSF) pressure
- Increased intraocular pressure
- Psychiatric disorders such as schizophrenia or acute psychosis
- Thyrotoxic states (conditions caused by excessive quantities of thyroid hormones)

Side / Adverse Effects

Medical attention is needed if any of the following side effects occurs:

- Bradycardia (slow heartbeat)
- Cardiac arrhythmias (irregular heartbeat)
- Hypotension
- Increased blood pressure
- Laryngospasm or other forms of airway obstruction
- Respiratory depression
- Tachycardia (fast heartbeat)
- Tonic and clonic muscle movements
- Tremor (trembling)
- Vocalization
- Vomiting

Medical attention may be needed if any of the following side effects continues or is bothersome:

- Double vision
- Emergence reaction (alteration in mood or body image; delirium; dissociative or floating sensations)
- Loss of appetite
- Nausea with or without vomiting
- Nystagmus (wandering or back-and-forth eye movements)
- Pain at injection site
- Reddened skin or skin rash
- Visual hallucinations
- Vivid dreams or illusions

Packaging and Storage

Store below 40 °C (104 °F), preferably between 15 and 30 °C (59 and 86 °F), unless otherwise specified by the manufacturer. Protect from light and heat. Protect from freezing.

Additional Information

- Ketamine may be administered intramuscularly or intravenously. Intravenous administration produces anesthesia more rapidly than intramuscular administration.

- Ketamine may cause vomiting following administration. To prevent possible aspiration of vomitus, ketamine should be administered on an empty stomach.

- Because ketamine increases salivary and tracheal-bronchial mucous gland secretions, use of atropine, scopolamine, or another drying agent is recommended prior to induction of anesthesia.

- A state of confusion (emergence reaction) may occur during recovery. Administration of a benzodiazepine prior to or concurrently with ketamine, or just prior to termination of surgery, may decrease the incidence of an emergence reaction.

Preparation of Dosage Form
For direct intravenous administration—The 100-mg-per-mL concentration of ketamine must be diluted with an equal volume of sterile water for injection, 0.9% sodium chloride injection, or 5% dextrose injection, prior to administration.

For intravenous infusion—Add 10 mL of the 50-mg-per-mL concentration or 5 mL of the 100-mg-per-mL concentration of ketamine (base) to 500 mL of 5% dextrose or 0.9% sodium chloride injection and mix well. The resultant solution contains 1 mg of ketamine (base) per mL. If fluid restriction is necessary, 250 mL of the diluent may be used to provide a solution containing 2 mg of ketamine (base) per mL.

Incompatibilities
Ketamine and barbiturates should not be administered in the same syringe because they **will form a precipitate**.

Lidocaine

Lidocaine is a local anesthetic. Parenteral-local anesthetics are generally used to provide local or regional anesthesia, analgesia, and varying degrees of motor blockade prior to surgical procedures and obstetric delivery. Vasoconstrictors may be added to local anesthetic injections to decrease the rate of local clearance of the local anesthetic. However, additional precautions pertinent to the use of a vasoconstrictor must be considered.

Indications

Lidocaine is indicated in the following types of anesthesia:

- Caudal or lumbar epidural (with or without epinephrine)
- Subarachnoid administration (with dextrose)
- Local infiltration (with or without epinephrine)
- Peripheral nerve block
- Local infiltration

Table of Indications and Doses

Indication	Adult Dose
Caudal analgesia (obstetrical)	100 to 300 mg as a 0.5 to 1% solution.
Epidural anesthesia (lumbar)	Analgesia: 250 to 300 mg (25 to 30 mL) as a 1% solution.
	Anesthesia: 225 to 300 mg (15 to 20 mL) as a 1.5% solution; or 200 to 300 mg (10 to 15 mL) as a 2% solution.
Obstetrical low spinal (saddle block) anesthesia	Normal vaginal delivery: 9 to 15 (0.6 to 1 mL) of lidocaine hydrochloride and dextrose as a 1.5% solution; or 50 mg (1 mL) of lidocaine hydrochloride and dextrose as a 5% solution to provide perineal anesthesia for about 100 minutes and analgesia for about another 40 minutes. Cesarean section and deliveries requiring intrauterine manipulation: 75 mg (1.5 mL) of lidocaine hydrochloride and dextrose as a 5% solution.
Percutaneous infiltration	5 to 300 mg (up to 60 mL as a 0.5% solution; up to 30 mL as a 1% solution).
Peripheral nerve block	Paracervical : 100 mg (10 mL) per side as a 1% solution; may be repeated if necessary at intervals of not less than 90 minutes.
	Pudendal: 100 mg (10 mL) per side as a 1% solution.
Sympathetic nerve block (lumbar)	50 to 100 mg (5 to 10 mL) as a 1% solution.

Note: Dosages given for epidural anesthesia are usual total doses; actual dosage must be based on the number of dermatomes to be anesthetized (2 to 3 mL of the indicated concentration per dermatome).

Common Brand Names, Dosage Forms, and Strengths

Brand names available:
Acetoxyline; Anestacon; Anestecain; Anestecidan; Ardecaine; Dalcaine; Dilocaine; Esracain; L-Caine; Leostesin; Lidalgan; Lidesthesin; Lidocard; Lidocaton; Lidoject; Lido Pen; Lignostab;

Mesocaine; Nurocaine; Xylocaine; Xylocaine-MPF; Xylocaine-MPF with Glucose; Xylocaine 5% Spinal; Xylocard; Xylocitin; Xyloneural; Xylonor; Xylotox.

Generics may be available.

Lidocaine is available in the following injectable dosage forms and strengths—

Lidocaine Hydrochloride Injection USP:
With preservative (methylparaben 1 mg per mL): 0.5% (5 mg per mL), 1% (10 mg per mL), 2% (20 mg per mL).
Without preservative: 0.5% (5 mg per mL), 1% (10 mg per mL), 1.5% (15 mg per mL), 2% (20 mg per mL), and 4% (40 mg per mL).

Lidocaine Hydrochloride and Dextrose Injection USP: 1.5% (15 mg per mL) with dextrose 7.5% (75 mg per mL) and 5% (50 mg per mL), with dextrose 7.5% (75 mg per mL).

Lidocaine Hydrochloride and Epinephrine Injection USP:
With preservative (methylparaben 1 mg per mL): 0.5% (5 mg per mL) with epinephrine 1:200,000; 1% (10 mg per mL) with epinephrine 1:100,000; 1% (10 mg per mL) with epinephrine 1:200,000; and 2% (20 mg per mL) with epinephrine 1:100,000.
Without preservative: 0.5% (5 mg per mL) with epinephrine 1:200,000; 1% (10 mg per mL) with epinephrine 1:100,000; 1% (10 mg per mL) with epinephrine 1:200,000; 1.5% (15 mg per mL) with epinephrine 1:200,000; and 2% (20 mg per mL) with epinephrine 1:200,000; 2% (20 mg per mL) with epinephrine 1:100,000.

Considerations Before Using

Precautions to Consider

- Pregnancy

Lidocaine crosses the placenta by diffusion. Retrospective studies of pregnant women receiving local anesthetics for emergency surgery early in pregnancy have not shown that local anesthetics cause birth defects. Lidocaine may cause uterine artery constriction.

- Labor and delivery

Epidural, subarachnoid, paracervical, or pudendal administration of lidocaine may produce changes in uterine contractility and/or maternal expulsive efforts.

Paracervical block may shorten the first stage of labor and facilitate cervical dilation. However, epidural and subarachnoid administration of local anesthetics may prolong the second stage of labor by interfering with motor function or removing the patient's reflex urge to bear down. Use of local anesthetics during delivery may increase the need for forceps-assisted delivery.

Maternal hypotension, caused by sympathetic nerve blockade resulting in vasodilation, may occur during regional anesthesia.

Maternal convulsions and cardiovascular collapse have been reported following paracervical administration of local anesthetics early in pregnancy (for elective abortion), suggesting rapid systemic absorption under these circumstances.

Fetal bradycardia (slow heartbeat), possibly associated with fetal acidosis, has been reported in 20 to 30% of patients receiving amide-type local anesthetics such as lidocaine via paracervical block. The risk of this complication may be increased if prematury, postmaturity, toxemia of pregnancy, preexisting fetal distress, or uteroplacental insufficiency is present. Risk-benefit must be considered when lidocaine is used for paracervical block in these conditions. Monitoring of fetal heart rate is recommended during paracervical block.

- Postpartum

Neonatal neurological disturbances such as diminished muscle strength and tone may occur for 1 to 2 days postpartum. Marked neonatal central nervous system (CNS) depression has been reported following paracervical block. Also, inadvertent fetal intracranial injection during intended caudal, paracervical, or pudendal administration may cause neonatal depression and convulsions.

- Breastfeeding

Lidocaine is distributed into breast milk. However, problems in humans have not been documented.

Drug Interactions and / or Related Problems

Lidocaine should not be administered to patients using the following medicines:

- CNS depression–producing medications, including those commonly used as preanesthetic medication or for supplementation of local anesthesia
- Vasoconstrictors such as epinephrine, methoxamine, or phenylephrine

For concurrent use of sympathomimetic vasoconstrictors such as epinephrine, levonordefrin, norepinephrine, or phenylephrine (in addition to those interactions listed above):

- Anesthetics, hydrocarbon inhalation
- Antidepressants, tricyclic
- Beta-adrenergic blocking agents, including ophthalmic agents
- Cocaine, mucosal-local
- Digitalis glycosides
- Droperidol
- Haloperidol
- Maprotiline
- Phenothiazines

Medical Considerations / Contraindications

Except under special circumstances, this medication should not be used when the following medical problems exist:

- For subarachnoid block:
  - Complete heart block
  - Hemorrhage, severe
  - Hypotension, severe
  - Local infection at the site of proposed lumbar puncture
  - Shock
  - Septicemia

- For subarachnoid anesthesia:
  - CNS disease, preexisting, attributable to infection, tumor, or other causes
  - Coagulation defects induced by anticoagulant therapy or hematologic disorders

- For vasoconstrictor-containing preparations:
  - Cardiac disease or arrhythmias
  - Hypertension
  - Hyperthyroidism
  - Vascular disease, peripheral

Risk-benefit should be considered when the following medical problems exist:
- Cardiovascular function impairment
- Sensitivity to amide-type anesthetics or related compounds
- Inflammation and/or infection in region of injection

Side / Adverse Effects

Medical attention is needed if any of the following side effects occurs:
- Back pain
- Bradycardia (dizziness)
- Cardiac arrhythmias (irregular heartbeat)
- Chest pain
- Dizziness
- Drowsiness
- Headache
- Hives (raised red swellings on the skin, lips, tongue, or in the throat)
- Hypertension
- Hypotension (dizziness)
- Hypothermia (shivering)
- Impotence (loss of sexual function)
- Incontinence, fecal and/or urinary (inability to hold bowel movement and/or urine)
- Methemoglobinemia (bluish lips and fingernails; breathing problems; dizziness; fatigue; headache; rapid heart rate; weakness)
- Nausea and/or vomiting
- Paralysis of legs
- Paresthesias (tingling or “pins and needles” sensation)
- Persistent anesthesia (numbness)
- Pruritus (itching)
- Respiratory paralysis (inability to breathe without assistance)
- Restlessness
- Seizures (convulsions)
- Skin rash
- Tachycardia (rapid heart rate)
- Vasodilatation, peripheral (dizziness)

Note: Some patients receiving lidocaine for spinal anesthesia have developed neurologic complications following anesthesia. The neurologic complications usually are temporary paresthesias and back pain (transient radicular irritation). However, persistent paresthesia,

paralysis of legs, or impairment of bodily functions (e.g., incontinence) may indicate a serious neurologic complication, cauda equina syndrome. Uneven distribution of hyperbaric lidocaine following spinal administration may contribute to cauda equina syndrome. In cases of transient radicular irritation, symptoms resolve within a few days to a few weeks.

Overdose

Clinical effects of acute overdose:

- Apnea
- Circulatory depression
- Methemoglobinemia
- Seizures

Treatment of overdose:

- Specific treatment:
  - For circulatory depression: Administration of a vasopressor and intravenous fluids is recommended. For maternal hypotension during obstetrical anesthesia, it is recommended that the patient be placed on her left side, if possible, to correct the aortocaval compression by the gravid uterus. Delivery of the fetus may improve the response of the obstetric patient to cardiopulmonary resuscitation.

  - For seizures: Protect the patient and administer oxygen immediately. If seizures do not respond to respiratory support, administering a benzodiazepine such as diazepam or an ultra-short acting barbiturate such as thiopental or thiamylal intravenously is recommended.

  - For methemoglobinemia: Administration of methylene blue is recommended.

- Monitoring—Blood pressure, heart rate, neurologic status, and respiratory status should be monitored continuously.

- Supportive care—Securing and maintaining a patent airway, administering oxygen, and instituting assisted or controlled respiration as required.

Packaging and Storage

For Lidocaine Hydrochloride Injection USP and Lidocaine Hydrochloride and Dextrose Injection USP—store below 40 °C (104 °F), preferably between 15 and 30 °C (59 and 86 °F), unless otherwise specified by the manufacturer. Protect from freezing.

For Lidocaine Hydrochloride and Epinephrine Injection USP—store below 40 °C (104 °F), preferably between 15 and 30 °C (59 and 86 °F), unless otherwise specified by the manufacturer. Protect from freezing. Protect from light.

Additional Information

- The safety and effectiveness of local anesthetics depend upon proper dosage, correct technique, adequate precautions, and readiness for emergencies**. Resuscitative equipment, oxygen, and**

other resuscitative drugs should be immediately available when any local anesthetic is used. Intravenous access should be obtained prior to the placement of major nerve blocks to permit the administration of emergency drugs during resuscitation if a serious adverse effect occurs.

- The recommended doses are given as a guideline for use in the average adult. **The actual dosage and maximum dosage must be individualized,** based on age, size, and physical status of the patient and the expected rate of systemic absorption from the injection site. The lowest dosage (volume and concentration) that produces the desired results should be used.

- Hyperbaric 5% lidocaine should be diluted with an equal volume of cerebrospinal fluid or preservative-free saline when it is used for spinal anesthesia.

- Lidocaine 5%, with 7.5% dextrose, is not recommended for continuous spinal anesthesia.

- Local anesthetics may be administered as single injections, continuously, or intermittently through an indwelling catheter. Fractional doses are especially recommended for peridural blocks.

- Local anesthetics should be injected slowly with frequent aspirations before and during the injection, to reduce the risk of inadvertent intravascular administration.

- For peridural blocks, injection of a small test dose (usually 2 to 5 mL) is recommended so that the patient can be monitored for signs of inadvertent subarachnoid or intravascular administration.

- The extent and degree of subarachnoid block depend on the position of the patient during and immediately after injection, dosage, specific gravity of the solution, volume of solution used, force of injection, and the level of puncture. Hyperbaric solutions (with dextrose added to render the solution heavier than cerebrospinal fluid [CSF]) are usually used for low spinal anesthesia. Isobaric solutions (having the same specific gravity as CSF) produce anesthesia at the level of intrathecal injection. Hypobaric solutions (diluted to have a lower specific gravity than CSF) are used to produce anesthesia of thoracic structures.

- Vasoconstrictors decrease the rate of local clearance of local anesthetics, thereby reducing the risk of systemic toxic reactions, prolonging the anesthetic effect, increasing the frequency of complete conduction blocks at low anesthetic concentrations, and permitting larger maximum single doses of anesthetics to be administered.

Magnesium Sulfate

Magnesium sulfate is an anticonvulsant and a tocolytic (uterine muscle relaxant) agent.

Indications

Magnesium sulfate is indicated in the prevention and immediate control of life-threatening seizures in the treatment of severe toxemias (pre-eclampsia and eclampsia) of pregnancy. It may also be used as a tocolytic agent (uterine relaxant) in the management of premature labor.

Table of Indications and Doses

Indication	Adult Dose
Seizures, in toxemia of pregnancy	Intravenous (IV), 4 to 5 grams in 250 mL of 5% dextrose injection USP or 0.9% sodium chloride infused over 30 minutes. Simultaneously, intramuscular (IM) doses of up to 10 grams are given; or IV, an initial dose of 4 grams may be given by diluting the 50% solution to a 10 or 20% concentration; the diluted fluid may then be injected intravenously over a period of 3 to 4 minutes. Subsequently, 4 to 5 grams are injected intramuscularly into alternate buttocks every 4 hours as needed. Alternatively, after the initial intravenous dose, some clinicians administer 1 or 2 grams per hour as an IV infusion.
Premature labor	Initial: IV, 4 to 6 grams infused over 20 to 30 minutes. Maintenance: IV infusion, 1 to 3 grams per hour until contractions stop.

Common Brand Names, Dosage Forms, and Strengths

Generics may be available.

Magnesium sulfate is available in the following dosage forms and strengths:

Injectable dosage form—

Magnesium Sulfate Injection USP:

10% w/v (1 gram [8 mEq of magnesium] per 10 mL)

12.5% w/v (1.25 grams [10 mEq of magnesium] per 10 mL)

20% w/v (2 grams [16 mEq of magnesium] per 10 mL)

50% w/v (5 grams [40 mEq of magnesium] per 10 mL)

Considerations Before Using

Precautions to Consider

- Pregnancy

Magnesium sulfate rapidly crosses the placenta and reaches serum concentrations in the fetus that approximate those in the mother. The effects in the neonate may include hypotonia (muscular weakness), drowsiness, and respiratory depression. Bony abnormalities and

congenital rickets have been reported in neonates born to mothers treated with injectable magnesium sulfate for prolonged periods of time (4 to 13 weeks' duration).

- Breastfeeding

Magnesium sulfate is distributed into breast milk. The milk concentrations are approximately twice those in maternal serum.

Drug Interactions and / or Related Problems

No drug interactions and/or related problems of major clinical significance have been selected for consideration prior to administration of magnesium sulfate.

Medical Considerations / Contraindications

Except under special circumstances, this medication should not be used when the following medical problems exist:

- Heart block
- Kidney failure (creatine clearance < 20 mL per minute)

Risk-benefit should be considered when the following medical problem exists:

- Renal function impairment, severe

Side / Adverse Effects

Medical attention is needed if any of the following side effects occurs:

- Signs of hypermagnesemia (in order of increasing serum magnesium concentrations):
  - Deep tendon reflexes present, but may be decreased
  - Prolonged PQ interval; widened QRS interval on ECG
  - Loss of deep tendon reflexes
  - Respiratory paralysis
  - Cardiac conduction, altered
  - Cardiac arrest

Medical attention may be needed if any of the following side effects continues or is bothersome*:*

- Early signs of hypermagnesemia:
  - Bradycardia (slow heartbeat)
  - Diplopia (double vision)
  - Flushing
  - Headache
  - Hypotension
  - Nausea
  - Shortness of breath
  - Slurred speech
  - Vomiting
  - Weakness

Overdose

Treatment of overdose:

- Blood pressure and respiratory support; artificial respiration is often required.
- To reverse heart block and respiratory depression: slow injection of intravenous **calcium gluconate** (5 to 10 mEq of calcium or 10 to 20 mL of a 10% solution).
- To remove magnesium sulfate if renal function is reduced: dialysis may be required.

Packaging and Storage

Store below 40 °C (104 °F), preferably between 15 and 30 °C (59 and 86 °F), unless otherwise specified by the manufacturer. Protect from freezing.

Additional Information

- Magnesium sulfate injection 50% must be diluted to a concentration of 20% or less prior to intravenous infusion.

- The rate of intravenous injection should generally not exceed 150 mg per minute, except in severe eclampsia with seizures.

Incompatibilities

- Formation of a precipitate may result when magnesium sulfate is mixed with solutions containing:
    - Alcohol (in high concentrations)
    - Alkali carbonates and bicarbonates
    - Alkali hydroxides
    - Arsenates
    - Barium
    - Calcium
    - Clindamycin phosphate
    - Heavy metals
    - Hydrocortisone sodium succinate
    - Phosphates
    - Polymyxin B sulfate
    - Procaine hydrochloride
    - Salicylates
    - Strontium
    - Tartrates

- When magnesium sulfate is administered in total parenteral nutrition, separation of intravenous fat emulsions may occur with concentrations of magnesium greater than 20 mEq per mL.

- It has been reported that magnesium may reduce the antibiotic activity of streptomycin, tetracycline, and tobramycin when given together.

Mebendazole

Mebendazole is an anthelmintic agent (vermicidal).

Indications

Mebendazole is indicated as a primary agent against common roundworm (ascariasis due to *Ascaris lumbricoides*), multiple intestinal roundworm, pinworm (enterobiasis due to *Enterobius vermicularis*), hookworm (*Ancylostoma duodenale* and *Necator americanus*), and whipworm (trichuriasis due to *Trichuris trichiuria*) infections.

Mebendazole is also used in the treatment of other infections such as capillariasis (*Capillaria philippinensis*), gnathostomiasis (*Gnathostoma spinigerum*), and alveolar hydatid disease (*E. chinococcus multilocularis* and *E. alveolaris*).

Mebendazole is used as a secondary agent in the treatment of unilocular hydatid disease (*E. granulosus*) and pork worm (trichinosis due to *Trichinella spiralis*) infection.

Note: Not all species or strains of a particular worm may be susceptible to mebendazole. Its efficacy also varies with respect to preexisting diarrhea, gastrointestinal transit time, and degree of infection.

Table of Indications and Doses

Indication	**Adult Dose**
Ascariasis, trichuriasis, hookworm	Oral, 100 mg two times a day, for 3 days. May be repeated in 2 to 3 weeks if required.
Intestinal roundworm, multiple	Oral, 100 mg two times a day, for 3 days.
Enterobiasis	Oral, 100 mg as a single dose. Repeat in 2 to 3 weeks.
Capillariasis	Oral, 200 mg two times a day for 20 days.
Gnathostomiasis	Oral, 200 mg every 3 hours for 6 days.
Hydatid disease	Oral, 13.3 to 16.7 mg per kg of body weight three times a day for 3 to 6 months.
Trichinosis	Oral, 200 to 400 mg three times a day for 3 days, then 400 to 500 mg three times a day for 10 days.

Common Brand Names, Dosage Forms, and Strengths

Brand names available:
Anethan; Anthelmin; Antiox; Ascarobex; Bantenol; Eraverm; Feller; Fugacar; Gammax; Kindelmin; Lomper; Madicure; Mebenav; Mebendacin; Mebendan; Mebendil; Mebex; Mebutar; Moben; Multielmin; Necamin; Nemasole; Noverme; Oxitover; Panfugan; Pantelmin; Parelmin;

Parmeben; Sirben; Sufil; Tetrahelmin; Thelmox; Vermazol; Vermicidin; Vermirax; Vermox; Versid; Zol-Triq.

Generics may be available.

Mebendazole is available in the following dosage form and strength:
Oral dosage form—Mebendazole Tablets (Chewable) USP: 100 mg.

Considerations Before Using

Precautions to Consider

- Pregnancy

Mebendazole crosses the placenta. A post-marketing survey in pregnant women who inadvertently took mebendazole during the first trimester has not shown an incidence of spontaneous abortion or malformation greater than that of the general population. Mebendazole has not been shown to be teratogenic in humans.

- Breastfeeding

It is not known whether mebendazole is distributed into breast milk. However problems in humans have not been documented.

Drug Interactions and / or Related Problems

No drug interactions and/or related problems of major clinical significance have been selected for consideration prior to administration of mebendazole.

Medical Considerations / Contraindications

Risk-benefit should be considered when the following medical problem exists:

- Hepatic function impairment

Side / Adverse Effects

Medical attention is needed if any of the following side effects occurs:

- Hypersensitivity (fever, skin rash, or itching)
- Neutropenia (sore throat, fever, unusual tiredness and weakness)

Medical attention may be needed if any of the following side effects continues or is bothersome:

- Dizziness
- Gastrointestinal disturbances (abdominal pain or upset; diarrhea; nausea or vomiting)
- Hair loss
- Headache

Packaging and Storage

Store below 40 °C (104 °F), preferably between 15 and 30 °C (59 and 86 °F), unless otherwise specified by the manufacturer. Store in a well-closed container.

Additional Information

- Mebendazole tablets may be chewed, swallowed whole, or crushed and mixed with food.

- Mebendazole (very high doses) should preferably be taken with meals, especially fatty ones. This increases the bioavailability, absorption, and serum concentrations of mebendazole.

- For pinworms: Because of the high probability of transfer of pinworms, it is usually recommended that all the members of the household be treated at the same time, and that all bedding and nightclothes be washed (not shaken) after treatment to prevent reinfection.

- For hookworms and whipworms: In the treatment of hookworms and whipworms, especially in patients who are heavily infected or who have inadequate dietary intake of iron, concurrent iron therapy may be required if anemia is present. Iron therapy may need to be continued for up to 6 months to replenish iron stores.

Metronidazole

Metronidazole is an antibacterial and antiprotozoal (anti-unicellular organisms) agent.

Indications

Metronidazole is indicated in the treatment of pelvic infections (including endometritis, endomyometritis, tubo-ovarian abscess, postsurgical vaginal cuff infections caused by *Bacteroides* species, including the *B. fragilis* group, *Clostridium* species, *Peptococcus* species, and *Peptostreptococcus* species) and bacterial septicemia caused by *Bacteroides* species, including the *B. fragilis* group, and *Clostridium* species.

Metronidazole is indicated in the treatment of symptomatic and asymptomatic trichomoniasis caused by *Trichomonas vaginalis.* It is also used in the treatment of bacterial vaginosis (caused by *Gardnerella vaginalis*).

Metronidazole may be used in the prevention of infections in cesarean section (C-section), appendectomy in pregnant women, and sexual assault victims.

Table of Indications and Doses

Indication	**Dose**
Anaerobic infections (treatment)	Oral, 7.5 mg (base)* per kg of body weight, up to a maximum of 1 gram, every 6 hours for 7 days or longer. Or, intravenous infusion, 15 mg (base)* per kg of body weight initially, then 7.5 mg per kg of body weight, up to a maximum of 1 gram, every 6 hours for 7 days or longer.
Perioperative infections, prophylaxis	IV infusion, 15 mg (base)* per kg of body weight 1 hour prior to the start of surgery; and 7.5 mg per kg of body weight 6 to 12 hours after the initial dose.
Sexual assault victims, (prophylaxis of infections)	Oral, 2 grams (base)* as a single dose. (in conjunction with: IM 125 mg ceftriaxone, and oral, 1 gram azithromycin, or oral, 100 mg doxycycline two times a day for 7 days)
Trichomoniasis	Oral, 2 grams (base)* as a single dose; 1 gram two times a day for 1 day; or 250 mg three times a day for 7 days.
Vaginosis, bacterial	Oral, 500 mg (base)* two times a day for 7 days.

**Note*: The dosing and dosage forms available are expressed in terms of metronidazole base.

Common Brand Names, Dosage Forms, and Strengths

Brand names available:
Anaerobex; Apo-Metronidazole; Arcazol; Arilin; Clont; Deflamon; Efloran; Elyzol; Flagemona; Flagyl; Flagyl I.V.; Flagyl I.V. RTU; Fossyol; Gineflavir; Klion; Medazol; Meridonal; Metizol; Metodan; Metrajil; Metric 21; Metricin; Metrizol; Metro I.V.; Metrogyl; Metrolag; Metrolyl; Metroni; Metrozine; Metryl; Monasin; Nalox; Neo-Tric; Nida; Nidazol; Novonidazol; Orvagil; Perilox; Protogyl; Protostat; Rivozol; Salandol; Sawagyl; Servizol; Surimol; Tarozole; Trichocide; Tricho-Gynaedron; Trichonazole; Trichostop; Trichozole; Trichowas B; Trikacide; Trikamon; Trikozol; Trivazol; Vagilen; Vagimid; Vaginyl; Wagitran; Zadstat.

Generics may be available.

Metronidazole may be available in the following dosage forms and strengths:

Oral dosage forms—

Metronidazole Capsules: 500 mg (base).

Metronidazole Tablets USP: 250 mg (base) and 500 mg (base).

Injectable dosage forms—

Metronidazole Injection USP: 500 mg in 100 mL (base).

Metronidazole Hydrochloride For Injection: 500 mg (base).

Considerations Before Using

Precautions to Consider

- Pregnancy

Metronidazole crosses the placenta and enters rapidly the blood circulation of the fetus. It should not be used during the first trimester of pregnancy.

Metronidazole can be used during the second and third trimesters for trichomoniasis, if symptoms cannot be controlled by other treatments.

Also, **the one-day course therapy should not be used** since this results in higher maternal and fetal serum concentrations.

- Breastfeeding

Metronidazole is distributed into breast milk. **Use is not recommended in nursing mothers.** If treatment with metronidazole is necessary in nursing mothers, breast milk should be expressed and discarded. Breastfeeding can be resumed 24 to 48 hours after treatment is completed.

Drug Interactions and / or Related Problems

Metronidazole should not be administered to patients using the following medicines:

- Anticoagulants (coumarin- or indandione-derivative)
- Disulfiram

Alcoholic drinks are not recommended while taking metronidazole.

Medical Considerations / Contraindications

Except under special circumstances, this medication should not be used when the following medical problems exist:

- Active organic disease of the central nervous system (CNS), including epilepsy

- Blood disease, or history of
- Hepatic function impairment, severe

Side / Adverse Effects

Medical attention is needed if any of the following side effects occurs:

- Hypersensitivity (skin rash, hives, redness, or itching)
- Leukopenia (sore throat and fever)
- Pancreatitis (severe abdominal and back pain; anorexia; nausea and vomiting)
- Peripheral neuropathy (numbness, tingling, pain, or weakness in hands or feet)
- Seizures (episode of impairment or loss of consciousness, abnormal motor phenomena, sensory disturbances)
- Thrombophlebitis (pain, tenderness, redness, or swelling at site of injection)
- Vaginal candidiasis (vaginal irritation, discharge; or dryness not present before therapy)

Medical attention may be needed if any of the following side effects continues or is bothersome:

- Change in taste sensation, unpleasant or sharp metallic taste
- CNS effects (dizziness or lightheadedness; headache)
- Dryness of mouth
- Gastrointestinal disturbances (diarrhea; loss of appetite; nausea or vomiting; stomach cramps or pain)

Note: Discoloration of the urine may be noticed (dark urine). This is of no consequence and does not require medical attention.

Packaging and Storage

For oral dosage forms—store below 40 °C (104 °F), preferably between 15 and 30 °C (59 and 86 °F), unless otherwise specified by manufacturer. Store in well-closed, light-resistant container.

For injectable dosage forms—

Metronidazole Injection USP—store below 40 °C (104 °F), preferably between 15 and 30 °C (59 and 86 °F), unless otherwise specified by manufacturer. Protect from light. Protect from freezing.

Metronidazole Hydrochloride For Injection—prior to reconstitution, store below 30 °C (86 °F), in a light-resistant container, unless otherwise specified by manufacturer.

Additional Information

Patients with severely impaired hepatic function metabolize metronidazole slowly. Close monitoring for toxicity as well as reduction in dose may be recommended.

For oral dosage forms:

- Oral metronidazole should be taken with meals or snacks to reduce possible gastrointestinal irritation.

- When metronidazole is used in the treatment of trichomoniasis, sexual partners should receive concurrent therapy since asymptomatic trichomoniasis in male partner is a frequent source of reinfection in the female.

For injectable dosage forms:

- **Parenteral metronidazole should be administered by slow intravenous infusion only,** either continuously or intermittently over a 1-hour period**.**
- Metronidazole hydrochloride for injection must not be given by direct intravenous injection since the initial dilution has an extremely low pH (0.5 to 2). It must be diluted further and neutralized prior to administration.
- If metronidazole is administered concurrently with a primary intravenous solution, the primary solution should be discontinued while metronidazole is being infused.

For metronidazole hydrochloride for injection:

- Stability—
  - After reconstitution, solutions retain their potency for 96 hours, if stored below 30 °C (86 °F), in room light.
  - Diluted and neutralized solutions retain their potency for 24 hours.
  - **Do not refrigerate neutralized solutions** since precipitation may occur.

- Incompatibilities—
  - **Do not use aluminum needles** or hubs (connectors).
  - Mixing metronidazole with other medications for concurrent intravenous infusion is not recommended.

Oxytocin

Oxytocin is a stimulant of the contractions of the uterine muscle.

Indications

Oxytocin is indicated in the management of postabortion and postpartum bleeding or hemorrhage. It is indicated also for induction and augmentation of labor, management of incomplete abortion, and performance of therapeutic abortion. Oxytocin is indicated for stimulation of impaired milk ejection.

Table of Indications and Doses

Indication	Adult Dose
Augmentation or induction of labor	Intravenous infusion, initially no more than 0.5 to 2 milliunits per minute, increased every 15 to 60 minutes in increments of 1 to 2 milliunits per minute until adequate uterine activity is established, up to 20 milliunits per minute (usually 2 to 5 milliunits per minute).
Incomplete abortion (treatment), therapeutic abortion	Intravenous infusion, 10 Units at a rate of 20 to 40 milliunits per minute.
Hemorrhage, postpartum	Intravenous infusion, 10 Units at a rate of 20 to 40 milliunits per minute following delivery of the infant(s) and preferably the placenta(s). or Intramuscular, 10 Units after delivery of the placenta(s).
Postabortion hemorrhage	Intravenous infusion, 10 Units at a rate of 20 to 100 milliunits per minute.

Common Brand Names, Dosage Forms, and Strengths

Brand names available:
Orasthin; Orastina; Oxystin; Oxytal; Partocon; Partolact; Pitone-S; Pitocin; Piton-S; Pituisan; Pituitan; Pituitrin; Postuitrin-N; Synpitan; Syntocinon; Toesen; Utedrin.

Generics may be available.

Oxytocin is available in the following dosage forms and strengths:
Injectable dosage form—
Oxytocin Injection USP: 5 Units per mL, and 10 Units per mL.

Considerations Before Using

Precautions to Consider

- Pregnancy

Oxytocin is not indicated for use during the first trimester of pregnancy other than for the treatment of incomplete abortion or therapeutic abortion.

- Labor and delivery

Because of maternal and fetal risks, **oxytocin must be administered with caution**. It has been reported to cause fetal bradycardia, neonatal retinal hemorrhage, and neonatal jaundice, in addition to maternal effects.

Excessive dosage or administration of oxytocin to hypersensitive patients may cause uterine hypertonicity with spasm and tetanic contraction or uterine rupture.

Oxytocin may inhibit, rather than promote, expulsion of placenta and increase the risk of hemorrhage and infection.

- Breastfeeding

Problems in humans have not been documented. Only minimal amounts pass into breast milk.

Drug Interactions and / or Related Problems

Oxytocin should not be administered to patients using the following medicines:

- Oxytocics, other
- Sodium chloride, intra-amniotic for abortion
- Urea, intra-amniotic for abortion

Medical Considerations / Contraindications

Except under special circumstances, this medication should not be used when the following medical problems exist*:*

- Absolute contraindication to vaginal delivery
- Allergy to oxytocin, history of
- Hypertonic uterine patterns

Risk-benefit should be considered when the following medical problems exist*:*

- Relative contraindication to vaginal delivery
- Uterine inertia

Side / Adverse Effects

Medical attention is needed if any of the following side effects occurs:

- Afibrinogenemia or pelvic hematoma or postpartum hemorrhage (increased or continuing vaginal bleeding)
- Allergy (skin rash or itching; hives)
- Anaphylaxis, generalized (difficulty breathing; skin rash; itching; or hives)
- Cardiac arrhythmias or premature ventricular contractions (fast or irregular heartbeat)
- Hypotension (weakness; dizziness), followed by hypertension (continuing or severe headache) and reflexive tachycardia (fast heartbeat)

- Uterine rupture (increased or continuing vaginal bleeding; severe pelvic or abdominal pain)
- Water intoxication (seizures; coma; confusion; continuing headache; rapid weight gain)

Medical attention is needed if any of the following side effects continues or is bothersome:

- Nausea
- Vomiting

Packaging and Storage

For injectable dosage form: Oxytocin Injection USP—store below 40 °C (104 °F), preferably between 15 and 30 °C (59 and 86 °F), unless otherwise specified by manufacturer. Protect from freezing.

Additional Information

Patients receiving oxytocin should be hospitalized and under the supervision of a physician experienced in its use.

Oxytocin must be diluted and administered by intravenous infusion for induction or stimulation of labor. Intramuscular administration of oxytocin is not recommended for induction or stimulation of labor, since intramuscular administration is difficult to regulate and may lead to uterine hyperactivity and fetal distress.

It is recommended that oxytocin infusion be administered intravenously by means of an infusion pump, a microdrip regulator, or a similar device to allow precise adjustment of the flow rate.

Dosage must be adjusted to meet the individual requirements of each patient, on the basis of maternal and fetal response.

Preparation of Dosage Form
For induction or augmentation of labor—Using standard aseptic technique, add 10 Units of Oxytocin Injection USP to 1000 mL of normal saline (0.9% sodium chloride injection), lactated Ringer's solution—or other nonhydrating diluent. Final solution concentration is 10 milliunits per mL.

For control of postabortion or postpartum uterine bleeding—Using standard aseptic technique, add 10 to 40 Units of Oxytocin Injection USP to 1000 mL of a nonhydrating diluent. Final solution concentration is 10 to 40 milliunits per mL.

Paracetamol

Paracetamol (also called acetaminophen) is a pain reliever and fever reducer. Paracetamol provides symptomatic relief only; additional therapy to treat the cause of the pain or fever should be instituted when necessary.

Indications

Paracetamol is indicated to relieve mild to moderate pain and reduce fever. Paracetamol may be used when aspirin therapy is contraindicated or unadvisable, e.g., patients receiving uricosuric agents or anticoagulants, or those with upper gastrointestinal disease, or intolerance or hypersensitivity to aspirin.

Table of Indications and Doses

Indication	Adult Dose	Adult Prescribing Limits
Analgesic and antipyretic	Oral or rectal, 325 to 500 mg every 3 hours, 325 to 650 mg every 4 hours, or 650 mg to 1 gram every 6 hours as needed, while symptoms persist.	Up to 4 grams daily (for short-term therapy [up to 10 days]); Up to 2.6 grams daily (for long-term therapy).

Common Brand Names, Dosage Forms, and Strengths

Brand names available:
Abrol; Abrolet; Acamol; Acenol; Aceta Tablets; Acephen; Acetalgin; Acetamol; Actamine; 222AF; Afebrin; Aferadol; Aldolor; Alginina; Alpiny; Aminofen; Alvedon; Anacin-3; Anaflon; Andox; Anhiba; Anti-Algos; Antidol; APA; APA-Aparacet; Apacet Regular Strength Tablets; Apo-Acetaminophen (scored); Atasol Caplets; Asetam; Asomal; Asplin; Bebesan; Becetamol; Benmyo; Ben-u-ron; Cadafen; Calpol; Captin; Cetadol; Claradol; Contact; Dafalgan; Dapa; Datril; Dhamol; Dirox; Dolamine; Dolefin; Dolgesic; Doliprane; Dolofugin; Dolprone; Dorcol; Dorico; Dymadon; Efferalgan; Enelfa; Eu-Med; Exdol; Fanalgic; Febrilix; Febrin; Febrogesic; Fensum; Finimal; Fluxifarm; Gardan; Genapap Regular Strength Tablets; Genebs Regular Strength Tablets; Gelocatil; Geralgin; Hedex; Helon N; Kataprin; Korum; Labamol; Lemgrip; Lemsip; Malgis; Meda; Mexalen; Minoset; Mogil; Myalgin; Napasone; Neocitran; Neotrend; Neuridal; Nevral; Nilnocen; Nodolex; Nofedol; Oltyl; Ophinal; Pacemo; Pacemol; Paedol; Painex; Pamol; Panacete; Panado; Panadol; Panaleve; Paracet; Parasin; Paraspen; Parol; PCM; Phenaphen Caplets; Progesic; Prompt; Prontina; Pyrital; Robigesic; Rounox; Rubophen; Scentalgyl; Sedalon; Servigesic; Setamol; Setol; Sifenol; Sinpro; Stellacyl; Supramol; Tabalgin; Tamol; Tapar; Temperal; Tempo; Termalgin; Tiffy; Tylenol Regular Strength Caplets; Tylenol Regular Strength Tablets; Valadol; Valorin; Veralgina; Vips; Winadol; Zolben.

Generics may be available.

Paracetamol may be available in the following dosage forms and strengths:

Oral dosage forms—

Acetaminophen Capsules USP: 325 and 500 mg.

Acetaminophen Oral Granules: 80 mg (in individual packets).
Acetaminophen Oral Powders: 80 and 160 mg (in capsules).
Acetaminophen Oral Solution USP: 80 mg per mL, 100 mg per mL, 80 mg per 5 mL, 130 mg per 5 mL, 160 mg per 5 mL, and 500 mg per 15 mL.
Acetaminophen Oral Suspension USP: 48 mg per mL, 80 mg per mL, 80 mg per 5 mL, 100 mg per mL, 160 mg per 5 mL.
Acetaminophen Tablets USP: 120, 160, 325, 500, and 650 mg.
Acetaminophen Tablets (chewable) USP: 80, 120, and 160 mg.

Rectal dosage form—
Acetaminophen Suppositories USP: 325 and 650 mg.

Considerations Before Using

Precautions to Consider

- Pregnancy

Problems in humans have not been documented. However, paracetamol crosses the placenta.

- Breastfeeding

Problems in humans have not been documented. However, paracetamol is distributed into breast milk.

Drug Interactions and / or Related Problems

- Alcohol, especially chronic abuse of

Medical Considerations / Contraindications

Except under special circumstances, this medication should not be used when the following medical problems exist:

- Alcoholism, active
- Liver disease
- Viral hepatitis

Side / Adverse Effects

Medical attention is needed if any of the following side effects occurs:

- Agranulocytosis (fever with or without chills; sores, ulcers or white spots on lips or in the mouth; sore throat)
- Anemia (unusual tiredness or weakness)
- Dermatitis, allergic (skin rash, hives, or itching)
- Hepatitis (yellow eyes or skin)
- Renal colic (pain severe and/or sharp, in lower back and/or side)
- Renal failure (sudden decrease in amount of urine)
- Sterile pyuria (cloudy urine)
- Thrombocytopenia (rarely, unusual bleeding or bruising; black, tarry stools; blood in the urine or stools; pinpoint red spots on skin)

Overdose

Clinical effects of overdose:

- Acute overdose:
  - Gastrointestinal upset (diarrhea, loss of appetite, nausea or vomiting, stomach cramps or pain)
  - Increased sweating

- Chronic overdose:
  - Hepatotoxicity (pain, tenderness, and/or swelling in upper abdominal area)
    Note: The first indications of chronic overdose may be the signs and symptoms of liver damage (2 to 4 days after ingestion of overdose); maximal changes in the liver function tests will occur 3 to 5 days after the ingestion; hepatic failure may occur after 6 days.

  - Other symptoms of chronic overdose:
    Hepatic encephalopathy (with mental changes, confusion, agitation, or stupor), convulsions, respiratory depression, cerebral edema, coagulation defects, gastrointestinal bleeding, disseminated intravascular coagulation, hypoglycemia, metabolic acidosis, cardiac arrhythmias, and cardiovascular collapse may occur.

    Renal tubular necrosis leading to renal failure (bloody or cloudy urine, and sudden decreased amount of urine) may also occur.

Treatment of overdose:

- To decrease the absorption: Emptying stomach via induction of emesis or gastric lavage.

- To enhance the elimination: Hemodialysis or hemoperfusion.

- Specific treatment: Use of **acetylcysteine. It is recommended that acetylcysteine administration be instituted as soon as possible after ingestion of an overdose has been reported** without waiting for the results of plasma acetaminophen determinations or other laboratory tests. Acetylcysteine is most effective if treatment is started within 10 to 12 hours of ingestion of overdose. Begin with an oral dose of 140 mg per kg of body weight, then continue with doses of 70 mg per kg of body weight every 4 hours for 17 additional doses. Or, intravenously, doses of 300 mg per kg of body weight may be administered over a 20¼-hour period.

- Supportive care: Maintain fluid and electrolyte balance, correcting hypoglycemia, and administering vitamin K (if prothrombin time ratio exceeds 1.5) and fresh frozen plasma or clotting factor concentrate (if prothrombin time ratio exceeds 3).

Packaging and Storage

For oral dosage forms: Acetaminophen Capsules USP, Acetaminophen Tablets USP, Acetaminophen Tablets (chewable) USP—store below 40 °C (104 °F), preferably between 15 and 30 °C (59 and 86 °F), unless otherwise specified by manufacturer. Store in a tight container.

For Acetaminophen Oral Granules, Acetaminophen Oral Powders—store below 40 °C (104 °F), preferably between 15 and 30 °C (59 and 86 °F), unless otherwise specified by manufacturer.

For Acetaminophen Oral Solution USP, Acetaminophen Oral Suspension USP—store below 40 °C (104 °F), preferably between 15 and 30 °C (59 and 86 °F), unless otherwise specified by manufacturer. Store in a tight container. Protect from freezing.

For rectal dosage form: Acetaminophen Suppositories USP—store below 40 °C (104 °F), preferably between 15 and 30 °C (59 and 86 °F), in a well-closed container, unless otherwise specified by manufacturer. Protect from freezing.

Additional Information

- Oral absorption is decreased if paracetamol is taken following a high-carbohydrate meal.

Penicillin G Benzathine
Penicillin G Procaine

Penicillin G is an antibacterial agent. Penicillin G (natural penicillin) has activity against *Staphylococcus* and *Streptococcus* species, gram-negative cocci, *Neisseria meningitidis* and *N. gonorrhoeae*, and other organisms including *Actinomyces israelii, Bacillus anthracis*, oropharyngeal *Bacteroides* species, *Brorelia burgdorferi* and *Clostridium* sp., *Corynebacterium diphteriae*, *Erysipelothrix rhusiopathiae, Listeria monocytogenes, Spirillium minor*, *Streptobacillus moniliformis*, and *Treponema pallidum.*

Indications

Penicillin G benzathine (injectable) and penicillin G procaine are indicated for the treatment of infections caused by the various species of *Treponema* including *T. pallidum* (syphilis), *T. pallidum endemicum* (bejel), *T. carateum* (pinta), *T. pertenue* (yaws). They are also indicated for the treatment of bacterial septicemia and skin and soft tissue infections (such as mastitis) caused by susceptible organisms.

Table of Indications and Doses

Indication	**Adult Dose**
Syphilis (primary, secondary, and early latent)	Penicillin G benzathine, deep intramuscular (IM), 2,400,000 Units as a single dose.
Syphilis (tertiary and late latent, excluding neurosyphilis)	Penicillin G benzathine, deep IM, 2,400,000 Units once a week for 3 weeks.
Neurosyphilis	Penicillin G procaine, IM, 2,400,000 Units a day, and 500 mg of probenecid orally four times a day, for 10 to 14 days.
Bejel, pinta, or yaws (treatment)	Penicillin G benzathine, deep IM, 1,200,000 Units as a single dose.
Antibacterial	Penicillin G procaine, IM, 600,000 to 1,200,000 Units a day.

Common Brand Names, Dosage Forms, and Strengths

Brand names available:
Penicillin G benzathine—Benzetacil; Bicillin; Brevicilina; Cepacilina; Debecyclina; Diamoinocillina; Dibencil; Dulcepen; Durabiotic; Extencilline; Ka-Pen; Lentocillin; Leomypen; Longacillin; LPG; Megacillin; Noelin; Norocillin LA; Penadur; Pendepon; Pen-Di-Ben; Pendysin; Penidural; Penilente; Peniroger Retard; Permapen; Pipercilina; Provipen benzatina; Retarpen; Tardocillin; Tardopenil; Vetarcillin; Wycillina.

Generics may be available.

Penicillin G procaine—Aquacaine; Aquacillin; Aquasuspen; Ayercillin; Bicilline LA; Cilicaine; Crysticillin 300 A.S.; Delcilline; Depo-Penicillin; Distaquaine; Diurnal-Penicillin; Duracillin; Excolicin; Flo-Cillin; Fortepen; Francacilline; Hydracillin; Hypropen; Jenacillin O; Klaricina; Ledercillin; Lentopen; Mylipen; Nopenol; Novocaine-Penicillin; Novocillin; Pam; Penierm; Peniroger Procain; Pentids-P; Pfizerpen-AS; Polbicillinum; Praepacillin; Premocillin; Procapen; Promptcillin; Provipen Procaina; Retardillin; Rhinocilline; Sanciline Procaina 300; Servipen-G Forte; Solucillin; Therapen 4; Therapen I.M.; Uni-Biotic; Wycillin.

Generics may be available.

Penicillins may be available in the following dosage forms and strengths:

Oral dosage form—

Penicillin G Benzathine Suspension: 250,000 Units (156 mg) per 5 mL and 500,000 Units (312 mg) per 5mL.

Injectable dosage forms—

Sterile Penicillin G Benzathine Suspension USP: 600,000 Units in 1 mL; 1,200,000 Units in 2 mL; 2,400,000 Units in 4 mL; and 3,000,000 Units in 10 mL.

Sterile Penicillin G Procaine Suspension USP: 600,000 Units in 1 mL; 1,200,000 Units in 2 mL; 2,400,000 Units in 4 mL; 3,000,000 Units in 10 mL; 3,000,000 Units per 10 mL and 5,000,000 Units per 10 mL.

Considerations Before Using

Precautions to Consider

- Pregnancy

Penicillins cross the placenta. However, penicillins are widely used in pregnant women and problems have not been documented.

- Breastfeeding

Penicillins are distributed into breast milk. Although significant problems in humans have not been documented, the use of penicillins by nursing mothers may lead to sensitization, diarrhea, candidiasis, and skin rash in the infant.

Drug Interactions and / or Related Problems

Penicillins should not be administered to patients using any of the following medicines:

- Aminoglycosides
- Methotrexate
- Probenecid

Medical Considerations / Contraindications

Except under special circumstances, this medication should not be used when the following medical problem exists:

- Allergy to penicillins

Risk-benefit should be considered when the following medical problem exists:

- Gastrointestinal disease, history of, especially antibiotic-associated colitis

Side / Adverse Effects

Medical attention is needed if any of the following side effects occurs:

- Allergic reactions, specifically anaphylaxis (fast or irregular breathing; puffiness or swelling around the face; shortness of breath; sudden, severe decrease in blood pressure)
- *Clostridium difficile* colitis (severe abdominal or stomach cramps and pain; abdominal tenderness; watery and severe diarrhea, which may also be bloody; fever)
- Exfoliative dermatitis (red, scaly skin)
- Hepatotoxicity (fever; nausea and vomiting; yellow eyes or skin)
- Interstitial nephritis (fever; possibly decreased urine output; skin rash)
- Leukopenia or neutropenia (sore throat and fever)
- Mental disturbances (anxiety; confusion; agitation or combativeness; depression; seizures; hallucinations; expressed fear of impending death)
- Pain at site of injection
- Seizures (sudden episode of impairment or loss of consciousness, abnormal movements, and sensory disturbances)
- Serum sickness–like reactions (skin rash; joint pain; fever)
- Skin rash, hives, or itching

Medical attention may be needed if any of the following side effects continues or is bothersome:

- Gastrointestinal reactions (mild diarrhea; nausea or vomiting)
- Headache
- Oral candidiasis (sore mouth or tongue; white patches in mouth and/or on tongue)
- Vaginal candidiasis (vaginal itching and discharge)

Packaging and Storage

For injectable dosage forms: Sterile Penicillin G Benzathine Suspension USP, Sterile Penicillin G Procaine Suspension USP—store between 2 and 8 °C (36 and 46 °F).

For oral dosage form: Penicillin G Benzathine Suspension—store between 15 and 30 °C (59 and 86 °F), unless otherwise specified by the manufacturer.

Additional Information

- **Sterile penicillin G benzathine suspension and sterile penicillin G procaine suspension are for deep intramuscular injection only.** Do not administer intravenously, intra-arterially, subcutaneously, by fat-layer injection, or into or near a nerve.

- **Injection of penicillin G benzathine should be made at slow steady rate** to prevent blockade of the needle because of the high concentration of suspension material.

- Some patients may experience immediate toxic reactions to procaine especially when administered in large single doses. These reactions are usually transient and may be characterized by anxiety, confusion, agitation, depression, seizures, hallucinations, or expressed fear of impending death.

Incompatibilities
Administering penicillins and aminoglycosides, such as gentamycin, concurrently may result in substantial mutual inactivation. If these two groups of antibacterials are to be administered concurrently, they should be administered in different sites at least 1 hour apart. **Do not mix penicillins and aminoglycosides in the same intravenous bag, bottle, or tubing.**

Sulfadoxine and Pyrimethamine

Sulfadoxine and pyrimethamine combination is an antiprotozoal (anti-unicellular microorganisms) agent. Sulfadoxine (a bacteriostatic sulfonamide) and pyrimethamine interfere at two sequential steps in the protozoal metabolism of folic acid.

Indications

- Malaria treatment

Sulfadoxine and pyrimethamine combination is indicated in combination with quinine as a primary agent in the treatment of chloroquine-resistant malaria caused by *Plasmodium falciparum.*

- Malaria prevention

The combination of sulfadoxine and pyrimethamine is considered a secondary agent in the prevention of chloroquine-resistant malaria caused by *P. falciparum*.

Because of its possible toxicities, sulfadoxine and pyrimethamine is indicated only in patients at high risk of chloroquine-resistant malaria in remote areas and who are unable to take alternative medication.

Note: Some strains of *P. falciparum* have developed resistance to sulfadoxine and pyrimethamine combination.

Table of Indications and Doses

Indication	Adult Dose
Malaria (treatment)	Oral, 3 tablets as a single dose on day 3 of quinine therapy.
Malaria (prophylaxis)	Oral, 1 tablet once every 7 days; or 2 tablets once every 14 days.

Common Brand Names, Dosage Forms, and Strengths

Brand names available:
Fanaril; Fanasul; Fanasulf; Fanesil; Fansidar; Fanzil; Fonasil; Fontasul.

Sulfadoxine and pyrimethamine combination is available in the following dosage form and strength:

Oral dosage form—

Sulfadoxine and Pyrimethamine Tablets USP: 500 mg of sulfadoxine and 25 mg of pyrimethamine.

Considerations Before Using

Precautions to Consider

- Pregnancy

Sulfadoxine and pyrimethamine cross the placenta. The combination may interfere with folic acid metabolism in the fetus and **is generally not recommended for use during pregnancy**. However, malaria in pregnant women may be more severe than in nonpregnant women and may result in maternal death. The risk of adverse pregnancy outcomes including premature births, stillbirths, and abortion may be increased. These risks should be weighed against risks and benefits of sulfadoxine and pyrimethamine combination use during pregnancy.

- Breastfeeding

Sulfadoxine is excreted in breast milk. **Use is not recommended** in nursing women since sulfonamides may cause kernicterus (bilirubin encephalopathy) in the nursing infants. In addition, pyrimethamine may interfere with folic acid metabolism in nursing infants, especially when given in large doses to nursing women.

- Pediatrics

Sulfadoxine and pyrimethamine combination is contraindicated in infants under 2 months of age since sulfonamides may cause kernicterus in neonates.

Drug Interactions and / or Related Problems

Sulfadoxine and pyrimethamine should not be administered to patients using the following medicines:

- Bone marrow depressant
- Hemolytic medications, other
- Hepatotoxic medications, other

Medical Considerations / Contraindications

Except under special circumstances, this medication should not be used when the following medical problems exist:

- Allergy to sulfonamides, pyrimethamine, furosemide, thiazide diuretics, sulfonylureas, or carbonic anhydrase inhibitors

Risk-benefit should be considered when the following medical problems exist:

- Anemia
- Bone marrow depression
- Porphyria
- Renal function impairment

Side / Adverse Effects

Note: Fatalities have occurred, although rarely, due to severe reactions such as Stevens-Johnson syndrome, toxic epidermal necrolysis, fulminant hepatic necrosis, agranulocytosis, aplastic anemia, and other blood dyscrasias. These toxicities were associated with multiple dosing regimens. Therapy should be discontinued at the first appearance of skin rash or if symptoms of folic acid deficiency occur.

Medical attention is needed if any of the following side effects occurs:

- Atrophic glossitis (pain, burning, or inflammation of the tongue; change or loss of taste)
- Blood dycrasias, specifically agranulocytosis (fever; sore throat); megaloblastic anemia (unusual tiredness or weakness); or thrombocytopenia (unusual bleeding or bruising)
- Crystalluria and hematuria (blood in urine; lower back pain; pain or burning while urinating)
- Hepatitis (yellow eyes and skin)
- Hypersensitivity (skin rash; fever)
- Photosensitivity (increased sensitivity of skin to sunlight)
- Stevens-Johnson syndrome (aching of joints and muscles; redness; blistering, peeling, or loosening of skin; unusual tiredness or weakness)
- Thyroid function disturbances or goiter (swelling of front part of the neck)

Medical attention may be needed if any of the following side effects continues or is bothersome:

- Central nervous system (CNS) effects (anxiety; drowsiness; fatigue; headache; nervousness)
- Gastrointestinal disturbances (abdominal pain; diarrhea; nausea or vomiting)

Overdose

Clinical effects of overdose:

- Acute effects (in order of occurrence)—
  - Gastrointestinal toxicity (anorexia; severe vomiting)
  - CNS toxicity (ataxia; trembling; seizures)
  - Blood dyscrasias specifically leukopenia (fever; sore throat); megaloblastic anemia (unusual tiredness or weakness); or thrombocytopenia (unusual bleeding or bruising)

Treatment of overdose:

- To decrease absorption: Gastric emptying by inducing vomiting or by lavage.
- Specific treatment:
  - To control CNS stimulation and seizures: Administration of injectable benzodiazepines or short-acting barbiturates.
  - For folic acid antagonist-effect of pyrimethamine: Administration of leucovorin, intramuscularly, 5 to 15 mg a day for 3 days or longer.
  - To prevent renal damage: Adequate hydration.
- Monitoring:
  - Monitoring renal and hematopoietic status for at least 1 month following overdose.
- Supportive care:
  - Mechanical respiratory assistance, if necessary.

Packaging and Storage

Store below 40 °C (104 °F), preferably between 15 and 30 °C (59 and 86 °F), unless otherwise specified by the manufacturer. Store in well-closed, light-resistant container.

Additional Information

- Sulfadoxine and pyrimethamine combination may cause gastric irritation, sometimes resulting in vomiting, when given in high doses. If this occurs, the medication may be taken with meals or a snack, or the dosage may be reduced.

- Fluid intake should be sufficient to maintain urine output of at least 1200 to 1500 mL per day in adults.

- Therapy with **sulfadoxine should be discontinued if skin rash or symptoms of folic acid deficiency (atrophic glossitis) occur**. However, leucovorin (folinic acid) may be given to prevent folic acid deficiency because it does not interact with sulfadoxine or pyrimethamine activity and malarial parasites are unable to utilize preformed folic acid.

Suxamethonium

Suxamethonium (also called succinylcholine) is a neuromuscular blocking agent. These agents produce skeletal muscle paralysis by blocking neural transmission at the myoneural junction. They have no known effect on consciousness or pain threshold.

Indications

Suxamethonium is indicated as an adjunct to anesthesia to induce skeletal muscle relaxation and to facilitate the management of patients undergoing mechanical ventilation. Continuous infusion of suxamethonium may be used for short surgical procedures requiring muscle relaxation, such as delivery by cesarean section.

Table of Indications and Doses

Indication	Adult Dose
Adjunct to anesthesia	Intravenous (IV), usually 600 mcg (0.6 mg) (range 300 mcg [0.3 mg] to 1.1 mg) per kg of body weight, initially. Repeated doses may be administered if necessary for the maintaining degree of relaxation required. They are calculated on the basis of the response to the first dose. Intramuscular, 3 to 4 mg per kg of body weight, not to exceed a total of 150 mg. IV infusion, as a 0.1% to 0.2% solution in 5% dextrose injection, sodium chloride injection, or other appropriate diluent, administered at a rate of 500 mcg (0.5 mg) to 10 mg per minute, depending on the patient response and degree of relaxation required, for up to 1 hour.

Common Brand Names, Dosage Forms, and Strengths

Brand names available:
Anectine; Anectin Flo-Pack; Celocurin; Chlorsuccilin; Curalest; Dithilin; Leptosuccin; Lysthenon; Midarine; Mioflex; Muscuryl; Myolaxin; Myoplegine; Myotenlis; Pantolax; Quelicin; Scoline; Succicuran; Succinolin; Succinyl Asta; Sucolin; Sucostrin; Sux-Cert.

Generics may be available.

Suxamethonium is available in the following dosage forms and strengths:

Injectable dosage forms—

Succinylcholine Chloride Injection USP: 20 mg per mL, 50 mg per mL, and 100 mg per mL.

Succinylcholine Chloride for Injection USP: 500 mg and 1 gram.

Considerations Before Using

Precautions to Consider

- Pregnancy

Studies have not been done in humans. However, studies in animals have shown that suxamethonium may cause intrauterine growth retardation and limb deformities.

- Labor and delivery

The possibility of neonatal respiratory depression or reduced skeletal muscle activity should be considered when suxamethonium is used near delivery.

- Breastfeeding

Problems in humans have not been documented.

Drug Interactions and / or Related Problems

Suxamethonium should not be administered to patients using the following drugs:

- Aminoglycosides
- Anesthetics, parenteral-local
- Capreomycin
- Cholinesterase inhibitors, especially echothiophate, demecarium, and isoflurophate
- Citrate-anticoagulated blood (massive transfusions)
- Clindamycin
- Digitalis glycosides
- Insecticides, neurotoxic, exposure to, possibly including large quantities of malathion
- Lincomycin
- Physostigmine
- Polymyxins
- Procainamide
- Quinidine

Medical Considerations / Contraindications

Risk-benefit should be considered when the following medical problem exists*:*

- Malignant hyperthermia, history of in patient or close relative, or suspected predisposition to

Side / Adverse Effects

Medical attention is needed if any of the following side effects occurs:

- Anaphylactic, or other hypersensitivity reaction
- Bradycardia (slow heartbeat)
- Bronchospasm
- Cardiac arrhythmias (irregular heartbeat)
- Circulatory depression or collapse
- Edema (swelling)
- Erythema (reddened skin)
- Flushing of skin
- Hypertension (increased blood pressure)
- Hypotension (decreased blood pressure)

- Increased intraocular pressure (eye pain)
- Malignant hyperthermic crisis
- Myoglobinemia and myoglobinuria
- Tachycardia (fast heartbeat)

Medical attention is needed if any of the following side effects continues or is bothersome:

- Itching of skin
- Muscle pain and stiffness, postoperative (appearing 12 to 24 hours following administration and lasting several hours to a few days)
- Salivation, excessive
- Skin rash

Overdose

Clinical effects of overdose:

- Acute overdose:
  - Apnea (respiratory arrest)
  - Hypotension, severe (low blood pressure)
  - Paralysis, prolonged
  - Shock (hypotension; fast breathing; confusion; cold, clammy, blue skin)

Treatment of overdose:

- Specific treatment:
  The depolarization block produced by suxamethonium is not antagonized by anticholinesterase agents, such as edrophonium, neostigmine, and pyridostigmine. However, if succinylcholine has been administered over a prolonged period of time and the characteristic depolarization block has gradually changed into a nondepolarization block, as determined with a peripheral nerve stimulator, small doses of the anticholinesterase agent may be tried as an antagonist. If an anticholinesterase is used as an antagonist, it is recommended that atropine be administered prior to or concurrently with the antagonist to counteract its cholinergic side effects. Patients should be closely observed for at least 1 hour after reversal of nondepolarization block for possible return of muscle relaxation.

  The antagonists are merely adjuncts to, and are not to be substituted for, the institution of measures to ensure adequate ventilation. Ventilatory assistance must be continued until the patient can maintain an adequate ventilatory exchange unassisted.

- Monitoring:
  Determining the nature and degree of the neuromuscular blockade, using a peripheral nerve stimulator.

- Supportive care:
  - For apnea or prolonged paralysis: Maintaining an adequate airway and administering manual or mechanical ventilation.
  - For severe hypotension or shock: Administering fluids and vasopressors as needed to treat.

Packaging and Storage

For Succinylcholine Chloride Injection USP—store between 2 and 8 °C (36 and 46 °F). Protect from freezing.

For Succinylcholine Chloride For Injection USP—prior to reconstitution, store below 40 °C (104 °F), preferably between 15 and 30 °C (59 and 86 °F), unless otherwise specified by manufacturer.

Additional Information

- Since neuromuscular blocking agents may cause respiratory depression, **they should be used only by those individuals experienced in the techniques of tracheal intubation, artificial respiration, and administration of oxygen under positive pressure**; facilities for these procedures should be immediately available.

- The stated doses are intended as a guideline. **Actual dosage must be individualized**. To minimize the risk of overdosage, it is recommended that a peripheral nerve stimulator be used to monitor response to the neuromuscular blocking agents.

- Suxamethonium is usually administered intravenously but may be administered intramuscularly if necessary. Intramuscular injection should be deep and high into the deltoid muscle.

- An initial test dose of 10 mg may be administered to determine the sensibility of the patient and recovery time.

- Premedication with atropine or scopolamine is recommended to prevent excessive salivation.

- Repeated doses of suxamethonium may result in tachyphylaxis (rapid decrease in the response to the medication).

Stability
Suxamethonium loses potency and may form a precipitate when mixed with alkaline solutions of other medications. Therefore, suxamethonium should not be mixed in the same syringe or administered simultaneously through the same needle with solutions of short-acting barbiturates such as thiopental sodium or other medications that have an alkaline pH.

Only freshly prepared solutions of suxamethonium should be used. **Do not use solutions that are not absolutely clear.**

Tetanus Toxoid

Tetanus toxoid is a vaccine used to prevent tetanus. Tetanus is a serious illness that causes convulsions and severe muscle spasms. Death occurs in 30 to 40% of reported cases.

Indications

Tetanus toxoid is indicated for immunization against tetanus. It prevents tetanus infection and the severe complications that arise from the toxins produced by *Clostridium tetani.*

Pregnant women who are not immunized or inadequately immunized and who may deliver their infants under unhygienic conditions may expose their infants to neonatal tetanus.

Table of Indications and Doses

Indication	**Dose:** **Tetanus Toxoid Adsorbed**	**Dose:** **Tetanus Toxoid Fluid**
For tetanus prevention in unimmunized or inadequately immunized pregnant women	Intramuscular (IM), 0.5 mL. The first two doses should be given during the last two trimesters of pregnancy, 4 to 8 weeks apart. Third dose should be given 6 to 12 months after the second dose. Booster doses should be given every 10 years.	IM or subcutaneous, 0.5 mL. The first two doses should be given during the last two trimesters of pregnancy, 4 to 8 weeks apart. Third dose should be given 4 to 8 weeks after the second dose. Fourth dose should be given 6 to 12 months after the third dose. Booster doses should be given every 10 years.
For emergency tetanus prevention	If less than three primary doses have been administered— As soon as possible following the wound, one dose. For other than clean, minor wounds, tetanus immune globulin (human) or tetanus antitoxin (animal) should also be administered.	If less than four primary doses have been administered— As soon as possible following the wound, one dose. For other than clean, minor wounds, tetanus immune globulin (human) or tetanus antitoxin (animal) should also be administered.
	If more than three doses have been administered— For clean, minor wound, one dose, as soon as possible, if more than 10 years have passed since the last dose. For all other wounds as soon as possible, one dose, if more than 5 years have passed since the last dose. No tetanus immune globulin or antitoxin is required in either case.	If more than four doses have been administered— For clean, minor wound, one dose, as soon as possible, if more than 10 years have passed since the last dose. For all other wounds as soon as possible, one dose, if more than 5 years have passed since the last dose. No tetanus immune globulin or antitoxin is required in either case.

Common Brand Names, Dosage Forms, and Strengths

Tetanus toxoid is available in the following dosage forms and strengths:

Injectable dosage forms—

Tetanus Toxoid (Fluid) Injection USP:
4 Lf per 0.5 mL and 10 Lf per 1 mL.
Tetanus Toxoid Adsorbed (Injection) USP:
5 Lf per 0.5 mL and 10 Lf per 0.5 mL.

Note: Lf is the quantity of toxoid as assessed by flocculation.
The doses may contain thimerosal as a preservative.

Generic names may be available.

Considerations Before Using

Precautions to Consider

- Pregnancy

Studies in humans have not been done; however, problems in humans have not been documented.

Immune pregnant women confer protection to their infants through transplacental maternal antibody.

For inadequately immunized or unimmunized pregnant women, it is recommended that immunization with tetanus toxoid be initiated or continued during the last two trimesters. Unimmunized women should receive their first two doses of the primary series before childbirth.

- Breastfeeding

Problems have not been documented.

- Pediatrics

Use is **not recommended for infants up to 6 weeks of age.**

Drug Interactions and / or Related Problems

No drug interactions and/or related problems of major clinical significance have been selected for consideration prior to administration of tetanus toxoid.

Medical Considerations / Contraindications

Except under special circumstances, this medication should not be used when the following medical problems exist:

- Febrile illness, severe
- Respiratory disease, acute
- Tetanus infection

Side / Adverse Effects

Medical attention is needed if any of the following side effects occurs:

- Anaphylactic reaction (difficulty breathing or swallowing; hives; itching, especially of soles or palms; reddening of skin, especially around ears; swelling of eyes, face, or inside the nose; sudden and severe tiredness or weakness)
- Neurologic reaction (confusion; fever over 39.4 °C [103 °F]; severe or continuing headache; seizure; excessive sleepiness; unusual irritability; severe or continuing vomiting)

Additional side effects that may occur because of very high serum tetanus antitoxin levels and indicating for medical attention:

- Fever over 39.4 °C (103 °F)
- Lymphadenopathy (swelling of glands in armpit)
- Swelling, blistering, or pain at the injection site, which may be severe and extensive

Medical attention may be needed if any of the following side effects continues or is bothersome:

- Allergic reaction, delayed-type, cell-mediated (pain, tenderness, itching, or swelling at site of injection)
- Chills, fever, irritability, or unusual tiredness
- Nodule or sterile abscess at injection site
- Redness or hard lump at site of injection
- Skin rash

Note: If an arthus-type hypersensitivity reaction or a fever greater than 39.4 °C (103 °F) occurs following a dose of tetanus toxoid, the patient usually has very high serum tetanus antitoxin levels and no additional doses of tetanus toxoid should be given for any reason, including wounds, more frequently than every 10 years.

If a systemic allergic or neurologic reaction occurs following a dose of tetanus toxoid, the person should not be further immunized using tetanus toxoid; instead, passive immunization using tetanus immune globulin should be used when other than a clean, minor wound is sustained. Neurological reactions such as perpheral neuropathies have been temporally related to tetanus toxoid administration; however, no causal relationship has been established.

Packaging and Storage

Store between 2 and 8 °C (36 and 46 °F). Do not freeze.

Additional Information

- Persons infected with human immunodeficiency virus (HIV) may receive the tetanus toxoid whether they have asymptomatic or symptomatic HIV infection.

- Tetanus toxoid adsorbed and tetanus toxoid (fluid) are administered intramuscularly (or subcutaneously for tetanus toxoid fluid) into the area of the midlateral muscles of the thigh or into the deltoid. The same muscle should not be used more than once during the course of the primary immunization. Tetanus toxoid (fluid) also may be administered subcutaneously. The vaccine should **not be injected intravenously**.

- Shake well before using.

Thiopental

Thiopental is a barbiturate anesthetic agent.

Indications

Thiopental is indicated in induction of general anesthesia. It may be used for supplementing other anesthetic agents, or to produce hypnosis during balanced anesthesia with other agents such as analgesics or muscle relaxants.

Note: Thiopental is a controlled substance in the United States and Canada.

Table of Indications and Doses

Indication	Dose
General anesthesia:	
Induction	Dosage must be individualized by physician; however, as a general guideline: Intravenous (IV), 50 to 100 mg (2 to 4 mL of a 2.5% solution) as required; or 3 to 5 mg per kg of body weight as a single dose.
Maintenance	Dosage must be individualized by physician, however, as a general guideline: IV (intermittent), 50 to 100 mg (2 to 4 mL of a 2.5% solution) as required.

Common Brand Names, Dosage Forms, and Strengths

Brand names available:
Farmotal; Intraval; Leopental; Nesdonal; Pentothal; Thio-Barbityral; Thionembutal; Tiobarbital; Trapanal.

Generics may be available.

Thiopental is available in the following dosage forms and strengths:

Injectable dosage form—

Thiopental Sodium For Injection USP: 250 mg, 400 mg, 500 mg, 1 gram, 2.5 grams, 5 grams, and 10 grams.

Rectal dosage form—

Thiopental Sodium Rectal Suspension: 400 mg per gram.

Note: Thiopental rectal suspension is only used for basal anesthesia or basal narcosis when administration via rectal route is necessary, although absorption from the rectum may be unpredictable.

Considerations Before Using

Precautions to Consider

- Pregnancy

Use of barbiturate anesthetics during pregnancy may cause central nervous system (CNS) depression in the fetus. Thiopental crosses the placenta. The concentration in the cord vein is at its maximum 2 to 3 minutes after an intravenous dose is administered to the mother.

- Breastfeeding

Problems in humans have not been documented. Thiopental is distributed into breast milk. Small amounts may appear in breast milk following administration of large doses to the nursing mother.

Drug Interactions and / or Related Problems

Thiopental should not be administered to patients using any of the following medicines:

- CNS depression–producing medications

Thiopental may interact with—

- Alcohol

Medical Considerations / Contraindications

Except under special circumstances, this medication should not be used when the following medical problem exists:

- Porphyria
- Inflammatory, ulcerative, bleeding or neoplastic lesions of the lower bowel

Risk-benefit should be considered when the following medical problems exist:

- Cardiovascular disease, severe
- Congestive heart failure
- Hypotension or shock
- Respiratory disease involving difficulty in breathing or obstruction, particularly status asthmaticus
- Sensitivity to barbiturates

Side / Adverse Effects

Medical attention is needed if any of the following side effects occurs:

- Allergic reaction, acute (abdominal pain; anxiety or restlessness; skin rash, hives, itching, or redness; swelling of eyelids, face, or lips; unusually low blood pressure; wheezing or difficulty in breathing)
- Cardiac arrhythmias (fast, slow, or irregular heartbeat)
- Circulatory depression (unusually low blood pressure, severe or continuing)
- Cramping—with rectal administration only
- Diarrhea—with rectal administration only

- Excitement phenomena (coughing, difficulty in breathing, hiccups, muscle twitching or jerking)
- Rectal irritation or bleeding—with rectal administration only
- Respiratory depression (shortness of breath, slow or irregular breathing, troubled breathing)
- Thrombophlebitis (redness, swelling, or pain at injection site)

Medical attention may be needed if any of the following signs occurs after the surgical intervention:

- Emergence delirium (anxiety; confusion; excitement; hallucinations; nervousness; restlessness)
- Immune hemolytic anemia with renal failure (back, leg, or stomach pain; nausea, vomiting, or loss of appetite; unusual tiredness or weakness; fever; pale skin)
- Radial nerve palsy (weakness of wrist and fingers)

Side/adverse effects occurring postsurgically and indicating need for medical attention only if they continue:

- Headache
- Increased sensitivity to cold, during recovery (shivering or trembling)
- Nausea or vomiting
- Prolonged drowsiness

Overdose

Clinical effects of overdose (acute):

- CNS depression, severe
- Hypotension, severe
- Loss of peripheral vascular resistance
- Respiratory depression, severe, including apnea, leading to pulmonary edema and cardiorespiratory arrest

Treatment of overdose:

- Discontinuation of the anesthetic.
- Specific treatment: If overdosage occurs with a rectal barbiturate anesthetic preparation, the contents of the rectum should be promptly evacuated.
- Monitoring: Vital signs, blood gases, and serum electrolytes should be monitored.
- Supportive care: Establishing and maintaining a patent airway and administering 100% oxygen with assisted ventilation, if necessary.
- For hypotension: Intravenous fluids should be administered and the patient's legs raised. Vasopressors and inotropic drugs may be used as required.

Packaging and Storage

For Thiopental Sodium for Injection USP—prior to reconstitution, store below 40 °C (104 °F), preferably between 15 and 30 °C (59 and 86 °F), unless otherwise specified by the manufacturer.

For Thiopental Sodium Rectal Suspension—store below 40 °C (104 °F), preferably between 15 and 30 °C (59 and 86 °F), unless otherwise specified by manufacturer. Protect from freezing.

Additional Information

- **Barbiturate anesthetics should be administered only by individuals qualified in the use of general anesthetics**. Appropriate resuscitative and endotracheal intubation equipment, oxygen, and medications for prevention and treatment of anesthetic emergencies must be immediately available. Airway patency must be maintained at all times.

- **Dosage of anesthetics must be individualized** according to the desired depth of anesthesia, concomitant use of other medications and/or nitrous oxide, and the patient's physical condition, age, and weight.

- Care should be taken to avoid extravasation or intra-arterial injection of barbiturate anesthetics. Extra-vascular injection may cause pain, swelling, ulceration, and necrosis. Intra-arterial injection may produce arteritis, followed by vasospasm, edema, thrombosis, and gangrene of an extremity.

- Because the rapid distribution of barbiturate anesthetics out of the brain can result in light anesthesia characterized by reflex hyperactivity of the airway to stimulation, an adequate depth of anesthesia should be induced in patients predisposed to bronchospasm or with upper airway obstruction, when coughing or hiccuping are undesirable, and to avoid laryngospasm that may occur from direct or indirect stimulation.

- To minimize mucous secretions, anticholinergics, such as atropine or glycopyrrolate, may be administered as premedication. In addition, opiates may be administered to enhance the poor analgesic effects of the barbiturate anesthetic. Also, muscle relaxants may be required and should be administered separately.

- For injectable dosage form:
    - A test of 25 to 75 mg (1 to 3 mL of a 2.5% solution) may be administered to determine tolerance or unusual sensitivity to thiopental; patient reaction should be observed for at least 60 seconds.

    - A 2 or 2.5% concentration of thiopental in sterile water for injection is used for intermittent intravenous administration.

    - A 3.4% concentration of thiopental in sterile water for injection is isotonic; concentrations less than 2% in sterile water for injection should not be used because they can cause hemolysis (destruction of the blood cells).

Preparation of Dosage Form
Sterile water for injection, 0.9% sodium chloride injection, or 5% dextrose injection should be used as a diluent.

Since Thiopental for Injection USP contains no added bacteriostatic agent, extreme care in preparation and handling should be used at all times to prevent the introduction of microbial contaminants.

Stability
Injections should be freshly prepared and used within 24 hours after reconstitution; discard unused portions after 24 hours.

Injections are more stable if they are prepared with sterile water for injection or 0.9% sodium chloride injection. They should be kept refrigerated and tightly stoppered.

Sterilization by heating causes precipitates. Injections containing precipitates should not be administered.

Incompatibilities
Thiopental injections should not be mixed with suxamethonium, tubocurarine, or other medications that have an acid pH, because precipitation will occur.

Vitamin A

Vitamin A is a fat-soluble vitamin. Deficiency of vitamin A may lead to keratomalacia (a condition of the cornea that results in necrosis and blindness), xerophthalmia (excessive dryness of the cornea), and nyctalopia (night blindness).

Indications

Vitamin A is indicated in the prevention and treatment of vitamin A deficiencies.

The recommended intakes for most vitamins and minerals are increased during pregnancy, especially for women who are breastfeeding and those who are at high risk, i.e., women carrying more than one fetus, cigarette smokers, and alcohol and drug abusers.

Supplementation with vitamin A in the presence of vitamin A deficiency may reduce mortality and morbidity from certain diseases in children, including diarrhea and measles.

U.S. daily recommended dietary intakes for vitamin A are generally defined according to age or condition and form of vitamin A as follows:

Age and Condition	**Form of Vitamin A**	
	RE or mcg of Retinol	**Amount in Units as Retinol**
Adolescent and adult females	800	2665
Pregnant females	800	2665
Breastfeeding females	1200 to 1300	400 to 4330
Infants and children birth to 3 years old	375 to 400	1250 to 1330
Children 4 to 6 years old	500	1665
Children 7 to 10 years old	700	2330

Note: The expression of vitamin A activity has changed from Units to retinol equivalents (RE) or micrograms (mcg) of retinol, with 1 RE equal to 1 mcg of retinol. One RE of vitamin A is equal to 3.33 Units of retinol.

Most commercially available vitamin A products continue to be labeled in Units.

Table of Indications and Doses

Indication	Dose
Deficiency (treatment)	Treatment dose is individualized by prescriber based on severity of deficiency.
Xerophthalmia	Oral, 7500 to 15,000 RE (25,000 to 50,000 Units) a day; or IM, 15,000 to 30,000 RE (50,000 to 100,000 Units) a day for 3 days, followed by 15,000 RE (50,000 Units) a day for 2 weeks.

Note: Acute toxicity has been reported at a single dose of 450,000 RE (1,500,000 Units). Chronic toxicity has been reported at doses of 7500 RE (25,000 Units) a day for 8 months. However, patients with impaired liver function may develop toxicity at lower doses.

For the populations at high risk of vitamin A deficiency, WHO, UNICEF, and the International Vitamin A Consultative Group (IVACG) have published the following guidelines:

High-Dose Universal-Distribution for Prevention of Vitamin A Deficiency

Age	Dose of Vitamin A
Infants < 6 months of age, non-breastfed	50 000 IU orally.
Infants < 6 months of age, breastfed whose mothers have not received supplemental vitamin A	50 000 IU orally.
Infants 6–12 months of age	100 000 IU orally, every 4–6 months.
Children > 12 months of age	200 000 IU orally, every 4–6 months.
Mothers	200 000 IU orally, within 8 weeks of delivery.

Treatment of Women of Reproductive Age

Indication	Dose of Vitamin A
Night blindness or Bitot's spots	Oral, 5000 to 10 000 IU a day for at least 4 weeks. Not to exceed a daily dose of 10 000 IU; or oral, 25 000 IU weekly.
Signs of active xerophthalmia, severe (whether pregnant or not)*	Oral, 200 000 IU immediately on diagnosis; 200 000 IU the next day; and 200 000 IU at least 2 weeks later.

*It is necessary to balance the possible teratogenic effect or other risks of a high dose of vitamin A to the fetus (should she be pregnant) against the serious consequences (for her and the fetus) of vitamin A deficiency.

Common Brand Names, Dosage Forms, and Strengths

Brand names available:
Aquasol A; Vitamin A-POS; Vitaquimiol A; Vit-Asal-A; Vitemade A; Vitwas A; Vizo A; Vogan.

Generics may be available.

Vitamin A may be available in the following dosage forms and strengths:

Oral dosage forms—

Vitamin A Capsules USP and
Vitamin A Tablets: 10,000 Units (3000 RE), 25,000 Units (7500 RE), and 50,000 Units (15,000 RE).
Vitamin A Oral Solution: 5000 Units (1500 RE) per 0.1 mL.

Injectable dosage form—

Vitamin A Injection: 50,000 Units (15,000 RE) per mL.

Considerations Before Using

Precautions to Consider

- Pregnancy

Vitamin A crosses the placenta to only a limited extent. Fetal abnormalities (including urinary tract malformations), growth retardation, and early epiphyseal closure have been reported in children whose mothers took excessive amounts during pregnancy. Daily amounts from supplements exceeding 1800 RE (6000 Units) are not recommended because of potential toxicity in the fetus.

- Breastfeeding

Vitamin A is distributed into breast milk; however, problems in humans have not been documented with intake of normal daily recommended amounts.

Drug Interactions and / or Related Problems

Vitamin A should not be administered to a patient using the following medicines:

- Etretinate
- Isotretinoin

Medical Considerations / Contraindications

Except under special circumstances, this medication should not be used when the following medical problem exists:

- Hypervitaminosis A

Risk-benefit should be considered when the following medical problem exists:

- Renal failure, chronic

Overdose

Clinical effects of overdose:

- Acute effects: (Toxicity usually occurs about 6 hours after ingestion of acute overdoses of vitamin A.)
  - Bleeding from gums or sore mouth
  - Bulging soft spot on baby's head
  - Confusion or unusual excitement
  - Diarrhea
  - Dizziness or drowsiness
  - Double vision
  - Headache, severe
  - Irritability, severe
  - Peeling of skin, especially on lips and palms
  - Vomiting, severe

- *Note:* Excessive doses for adults are greater than 450,000 RE (1,500,000 Units). Daily doses higher than 1800 RE (6000 Units) in pregnant women are not recommended because of potential toxicity in the fetus.

Chronic effects:
(Toxicity may occur over prolonged period of time, with adult doses greater than 7500 RE [25,000] Units a day for 8 months.)

- Bone joints pain
- Drying or cracking of skin or lips
- Dry mouth
- Fever
- General feeling of discomfort, illness, or weakness
- Headache
- Increased sensitivity of skin to sunlight
- Increase in frequency of urination, especially at night, or in amount of urine
- Irritability
- Loss of appetite, stomach pain, or vomiting
- Loss of hair
- Seizures
- Stomach pain
- Unusual tiredness
- Vomiting
- Yellow-orange patches on soles of feet, palms of hands, or skin around nose and lips

Treatment of overdose:

- Overdose treatment includes withdrawing vitamin A and instituting symptomatic and supportive treatment. Some signs and symptoms will disappear within 1 week, while others may persist for several weeks to months.

- Women of childbearing potential should use effective contraception for at least one complete menstrual cycle after overdose and continue if necessary until vitamin A concentrations are no longer measurable in the blood. Patients with a positive pregnancy test should be counseled on the risk of toxicity in the fetus.

Packaging and Storage

For oral dosage forms:

Vitamin A Capsules USP and Vitamin A Tablets—store below 40 °C (104 °F), preferably between 15 and 30 °C (59 and 86 °F), unless otherwise specified by the manufacturer. Store in a tight container. Protect from light.

Vitamin A Oral Solution—store below 40 °C (104 °F), preferably between 15 and 30 °C (59 and 86 °F), unless otherwise specified by the manufacturer. Store in a tight container. Protect from light. Protect from freezing.

For injectable dosage form:

Vitamin A Injection—store below 40 °C (104 °F), preferably between 15 and 30 °C (59 and 86 °F), unless otherwise specified by the manufacturer. Protect from light. Protect from freezing.

Additional Information

- Best dietary sources of vitamin A include yellow-orange fruits and vegetables; dark green leafy vegetables; liver; and margarine;

- Injections are indicated when oral administration is not acceptable or possible, or when ocular damage is severe.

- **Exposure to light causes degradation of vitamin A**. Therefore, total parenteral solutions containing vitamin A should be protected from light and used within 24 hours of preparation.

- **Vitamin A has been found to adsorb to PVC containers and tubing.**

APPENDIX B. NORMATIVE CES COSTING MODEL

The Normative Model was described in Chapter 4 of the CES *User's Guide*. This appendix explains how the standard treatment guidelines that compose the Normative Model were determined and the sources of information used.

Reproductive Health Conditions Included in the Normative Model

The following 17 reproductive health conditions and services, categorized as five types, are included in the Normative CES Model.[1] These conditions and services are not comprehensive of all of the essential reproductive health services. Only those services for which equipment or commodities are needed are included.

Antenatal Care

- Antenatal Care (iron/folic acid supplementation, tetanus immunization, syphilis screening, malaria prophylaxis, and hookworm infestation treatment)

Safe and Clean Delivery and Postpartum Care

- Safe and Clean Delivery (including asphyxia and early treatment and prevention of hypothermia and of ophthalmia neonatorum)

Maternal and Neonatal Infections Related to Pregnancy and Delivery

- Neonatal Sepsis
- Maternal Sepsis
- Endometritis
- Mastitis
- Urinary Tract Infection (UTI)

Other Complications Related to Pregnancy and Delivery

- Severe Pre-eclampsia and Eclampsia
- Complications of Incomplete Abortion
- Dysfunctional Labor
- Lacerations
- C-section for Obstructed Labor and Other Indications
- Postpartum Hemorrhage

[1] The treatments for gonorrhea and chlamydia are identical; therefore, a single Treatment Cost Sheet has been developed in the Normative Model covering both of these diseases. Consequently, there are 16, not 17, Treatment Cost Sheets.

Reproductive Tract Infections

- Syphilis
- Gonorrhea
- Chlamydia
- Pelvic Inflammatory Disease (PID)

The Treatment Cost Sheets from the Normative Model spreadsheet file, presenting the episodic costs for drugs and supplies, are attached for further information.

Medical Equipment Packages

Four medical equipment packages have been defined in the Normative Model—

1. Health Worker Equipment Package
2. Delivery Room Equipment Package
3. Manual Vacuum Aspiration and Laceration Repair Equipment Package
4. C-Section Equipment Package

Further information about the equipment packages is provided in the section Assumptions Made in the Normative Model, and the contents of each package are provided in this appendix (following the Treatment Cost Sheets).

Sources of Data

Internationally established guidelines were used, whenever they were available, to establish the necessary drugs, equipment, and supplies needed to provide the services identified as basic for a reproductive health program. The World Health Organization (WHO) has defined and disseminated international standards for some areas of maternal, perinatal, and women's reproductive health. These guidelines were used when possible and were augmented with guidelines from other groups and well-known textbooks. The experience of the clinicians in the Reproductive Health Working Group contributed to the description of the services for which no international standards have been defined and to the definition of the quantity of equipment and commodities needed.

The drug costs used are from the 1999 edition of *International Drug Price Indicator Guide*, published by Management Sciences for Health.

The WHO guidelines***,*** used to define the standard of care for the following conditions, are listed below.

- Antibiotic regimens for maternal infection (sepsis, endometritis, mastitis, and urinary tract infection):
    - *The Prevention and Management of Puerperal Infections*. Report of Technical Working Group, 1992. Geneva, World Health Organization, 1995. WHO/FHE/MSM/95.4.
- Antibiotic regimens for syphilis, chlamydia, gonorrhea, and pelvic inflammatory disease:
    - *Management of Sexually Transmitted Diseases*. Geneva, World Health Organization

Global Programme on AIDS, 1994. WHO/GPA/TEM/94.1.

- Services provided in antenatal care:
    - *Antenatal Care*. Report of Technical Working Group, 1994. Geneva, World Health Organization, 1996. WHO/FHE/MSM/96.8.
- Equipment needs for instrumental deliveries, anesthesia, and C-section:
    - *Mother-Baby Package: Implementing Safe Motherhood in Countries*. Geneva, World Health Organization, 1994. WHO/FHE/MSM/94.11.
- Partograph and antenatal record:
    - *Preventing Prolonged Labour: The Partograph*. Geneva, World Health Organization, 1993. WHO/FHE/MSM/93.8-11.
    - *Home-Based Maternal Records: Guidelines for Development, Adaptation and Evaluation*. Geneva, World Health Organization, 1994.
- Neonatal care:
    - *Essential Newborn Care.* Report of Technical Working Group, 1994. Geneva, World Health Organization, 1996. WHO/FHE/MSM/96.13.

When the guidelines offered alternative antibiotic/anthelmintic regimens that were reported to have equal efficacy, single dose regimens were chosen over multiple dose regimens to improve compliance.

- Management of incomplete abortion:
    - Ipas. *Manual Vacuum Aspiration with Post-abortion Family Planning: MVA trainer's handbook*. Adapted for Ghana MotherCare Project, 1996. Carrboro, N.C., 1993.
    - World Health Organization. *Clinical Management of Abortion Complications: A Practical Guide*. Geneva, World Health Organization, 1994.

WHO Mother-Baby Package and clinical judgments were used to define the equipment packages and the quantity of some of the supplies in the commodities packages.

Assumptions Made in the Normative Model

For each category of reproductive health condition, brief explanations are given below about sources of information and the assumptions made in developing the Normative CES Model.

Antenatal Care

The services were selected from those described in the WHO Report of the Technical Working Group on Antenatal Care (TWG-ANC), and they are restricted to those considered essential for

all women to receive. Additional antenatal services to address pregnancy complications are included under the specific complication.

- Equipment to deliver these services are included in the Health Worker Equipment Package.

- Iron folate supplementation was defined as one tablet per day for the second and third trimesters (180 days). Although the WHO Mother-Baby Package prescribes this dose for 100 days, it was assumed that women should take iron folate throughout their pregnancy. The TWG-ANC recommended that the first ANC visit be made by the end of the fourth month (16 weeks). Hence most women would need approximately 24–28 weeks (168–196 days) of iron folate tablets.

- Two doses of tetanus toxoid would be the minimal requirement for an unimmunized woman. Fewer doses would be required by a woman with partial immunization, and no doses by a woman who had completed the five-dose schedule.

- Universal syphilis screening, malaria chemoprophylaxis, and treatment for intestinal worms would be determined by country policy. The screening test for syphilis (rapid plasma reagin [RPR]) is included in commodities in this section, but commodities for treatment of an infected woman and her partner are included in Reproductive Tract Infections. Two regimens for malaria chemoprophylaxis were defined, based on the drug defined in country policy: chloroquine (weekly prophylactic dose for 28 weeks) or sulfadoxine-pyrimethamine (two treatment doses) in areas with chloroquine-resistance. Four drug regimens are considered for worm mass treatment by WHO[2] with no clear recommendation for any one drug. Albendazole (mebendazole) was chosen because it was a single dose regimen.

Safe and Clean Delivery and Postpartum Care

- These services were defined by what a woman with an uncomplicated labor and delivery and a normal newborn would need for intrapartum and postpartum care, using the WHO Mother-Baby Package and clinical judgment. Additional intrapartum and postpartum services for complications are included under the specific complication. Equipment and supplies for infant resuscitation are listed under the Delivery Room Equipment Package because it was thought that this equipment needed to be immediately available for each delivery, even if not used.

- Equipment to deliver these services is included in the Health Worker Equipment Package and the Delivery Room Equipment Package.

- Oxytocin 10 units intramuscularly after the delivery of the placenta is included as routine for each mother. Routine use of oxytocins in the third stage (of delivery) is controversial.[3] We chose to include the use of oxytocin, rather than an ergometrine, because oxytocin appears

---

[2] World Health Organization. *Report of WHO informal consultation on hookworm infection and anemia in girls and women*. 1994. Geneva, World Health Organization, 1995.

[3] World Health Organization. *Care in normal birth*. Geneva, World Health Organization, 1996. WHO/FRH/MSM/96.24.

to be more stable during storage.[4] It was assumed that most of the women would be at risk of being anemic or of not receiving close monitoring in the postpartum period, and prophylactic use of oxytocin could be justified.[5] Active management of the third stage with parenteral ergometrine with delivery of anterior shoulder and controlled cord traction was not included for two reasons: the instability of ergometrine in tropical climates and the lack of human resources to properly implement this intervention (usually there is only one midwife/nurse/physician at delivery).

- One percent silver nitrate was selected for routine prophylaxis against ophthalmia neonatorum due to gonorrhea, the more severe infection. Silver nitrate, however, is not effective against infection caused by chlamydia, so 0.5 percent erythromycin eye ointment may be substituted if ophthalmia neonatorum is more likely to be caused by chlamydia. Some strains of gonorrhea are not sensitive to tetracycline.

- WHO recommends partographs for all women delivered in an institution.

- The minimal supplies to promote clean delivery are defined as soap for washing, disposable sterile cord ties, plastic sheeting for delivery surface, minimally two pairs of sterile gloves for labor and delivery, and chlorine tablets for disinfection.

Maternal and Neonatal Infections Related to Pregnancy and Delivery

Neonatal Sepsis

Infants with sepsis were assumed to require hospitalization and antibiotic administration for seven days. Drugs and dosages were based on recommendations in a standard manual for neonatal care.[6] It was assumed that the infant would be sick enough to need intravenous fluids (250 ml of 10% dextrose in water per day) and antibiotics for three days, and then could switch to breastfeeding and IM route for antibiotics for the remaining four days. Gentamicin and ampicillin cannot be given in the same syringe. An initial dose of ampicillin was included so that at least some antibiotic is on board during transportation to the hospital. Dosages were based on therapy for a 2.5 kg infant.

Maternal Sepsis, Endometritis, Mastitis, and Urinary Tract Infections

Antibiotics selected were based on the recommendations of the WHO Technical Working Group on Puerperal Sepsis. Women with sepsis were assumed to require hospitalization for parenteral antibiotics, intravenous fluids, and care. An initial dose of ampicillin was included so that at least some antibiotic is on board during transportation to the hospital. Endometritis, mastitis, and urinary tract infections were assumed to be able to be treated on an outpatient basis.

---

[4] World Health Organization. *Stability of injectable oxytocics in tropical climates*. Geneva, World Health Organization, 1993. WHO/DAP/93.6.

[5] Varney, H. *Nurse Midwifery*, 2nd ed. Boston, Blackwell Scientific Publications, 1987, pp. 379–80.

[6] Cloherty, JP, Stark, AR (eds). *Manual of Neonatal Care*, 2nd ed. Boston, Little, Brown and Co., 1985, pp. 148–149, 507–509.

Other Complications Related to Pregnancy and Delivery

Dysfunctional Labor

Piggybacked oxytocin infusion (10 IU in 1000 cc) is the general standard of care, based on clinical expertise of the working group. Main line intravenous solution is included for rehydration and to maintain hydration.

Severe Pre-eclampsia and Eclampsia

Only women with severe pre-eclampsia or eclampsia were considered for treatment, and these women would require hospitalization. Mild pre-eclampsia can be treated on an outpatient basis and requires no drug therapy. Magnesium sulfate was chosen as the drug of choice based on clinical expertise of the Working Group and results of the WHO clinical trial.[7] Magnesium sulfate is also the standard of care for women with severe pre-eclampsia in the United States.[8] The intravenous therapy regimen described in the clinical trial was followed (4–5 gm IV as loading dose and 1g per hour as maintenance dose). It was assumed that two days of therapy would be needed. Diazepam (1 dose) is included as first aid therapy before the referral. Urine dipsticks were included as a screening tool for referral and to monitor proteinuria among women who are diagnosed with severe pre-eclampsia/eclampsia. A Foley catheter is needed to monitor urinary output.

Complications of Incomplete Abortion

Equipment and commodities for manual vacuum aspiration (MVA) to evacuate the uterus after an incomplete abortion were defined per Ipas and WHO and are included in the MVA and Laceration Repair Equipment Package. Sepsis and hemorrhage that may be caused by incomplete abortion are included under Maternal Sepsis and Postpartum Hemorrhage.

Lacerations

Equipment needs for this complication will depend on the type of laceration being repaired. The MVA and Laceration Repair Equipment Package is defined to meet two types of equipment needs: perineal lacerations and episiotomy repairs for which minimal equipment is needed (lower perineal repair), and vaginal and cervical lacerations for which more equipment is needed (high vaginal/cervical repair). Local anesthesia was assumed to be adequate for both types, although general or spinal anesthesia may be needed for high vaginal/cervical repair in some instances. The commodities needed will be the same for both types of laceration repairs.

---

[7] Eclampsia Trial Collaborative Group. Which anticonvulsant for women with eclampsia? Evidence from the Collaborative Eclampsia Trial. *Lancet*, 1995, 345:1455–1463.

[8] Cunningham FG, MacDonald PC, Gant NF. *William's Obstetrics*, 18th ed. Norwalk, Conn., Appleton & Lange, 1989, p. 674.

C-Section

The C-Section Equipment Package contains the commodity needs for C-section and anesthesia, although it is recognized that instrumental delivery, C-section, and anesthesia may be necessary as the appropriate intervention for other conditions (antepartum hemorrhage, abnormal presentation, fetal distress, prolonged second stage, etc.). Commodity needs include those needed if general anesthesia is used and if spinal anesthesia is used. These were defined per the WHO Mother-Baby Package.

Postpartum Hemorrhage

The most common cause of maternal hemorrhage is uterine atony occurring after delivery of the baby. Postpartum hemorrhage frequently occurs after delivery of a woman with an antepartum hemorrhage. The oxytocin drugs included in the commodities described under this heading should be used in all cases of hemorrhage as initially it is assumed to be due to atony. Once it is established that the hemorrhage is due to lacerations, they will need to be repaired. Immediate treatment of atony with parenteral oxytocin, maintenance of contracted uterus with oral ergometrine for three days, and prompt repair of lacerations will reduce blood loss and the need for transfusion. Blood replacement should be required in only a small percentage of these cases. We made an assumption that blood transfusion facilities are available, either through blood bank or through “hot donor” (without banking). All women with hemorrhage, either antepartum or postpartum, will benefit from an additional 120 days of iron folate supplementation beyond the 42 days included for all postpartum women.

Reproductive Tract Infections

Syphilis, Gonorrhea, Chlamydia, and Pelvic Inflammatory Disease

WHO standard guidelines for management of sexually transmitted diseases (STDs) were used to define treatment for syphilis, gonorrhea, and chlamydia. Commodities for infections include treatment for women and one partner. Syphilis is the only one with a screening test (RPR) and it was assumed all syphilis was primary syphilis. No comparable field tests for gonorrhea or chlamydia are currently available, so it was assumed that these two infections would be diagnosed using the syndromic approach only. Treatment for both gonorrhea and chlamydia is included. One dose therapy is available for gonorrhea, but chlamydia requires seven days. A diagnosis of pelvic inflammatory disease is assumed to occur only in nonpregnant women.

Antenatal Care			Home	Category:	Antenatal Care							Normative Model			
		Expected Cases:	0									Calculation based on:		Int'l Med ($)	
Note	Level of Care	Drug	Route	Treatment Dose	Unit	Times/ Day	# Days	% Cases Treated	Drug Formulation	Base Qty per Unit	Units Per Dose	Total Units	Median Unit Cost	Cost per Episode	Wgtd. Avg. Tx. Cost
Iron/folate suppl	1	FERROUS SALT	PO	200 mg	tablet	1	180	100.0%	FESALTFOLIC:200MG/TA	200	1	180	0.0024	0.4320	0.4320
Tetanus immuni	1	TETANUS TOXOID VACCINE	INJ	0.5 ml	vial	1	2	100.0%	TETANUST:1DOS/AMP:IN	1	0.5	1	0.8730	0.8730	0.8730
Per country policy: Malaria prophylaxis															
Chloroquine-Tre	1	CHLOROQUINE PHOSPHAT	PO	2500 mg	tablet	1	1	50.0%	CHLRQUIN:150MG/TAB:T	150	17	17	0.0083	0.1383	0.0692
Chloroquine-We	1	CHLOROQUINE PHOSPHAT	PO	300 mg	tablet	1	28	50.0%	CHLRQUIN:150MG/TAB:T	150	2	56	0.0083	0.4648	0.2324
or															
Intermittent The	1	SULFADOXINE/PYRIMETHA	PO	1500 mg	tablet	1	2	50.0%	SULFADOX:500MG/TAB:T	500	3	6	0.0272	0.1632	0.0816
Hookworm when prevalence> 20-30%	1	MEBENDAZOLE	PO	500 mg	tablet	1	1	100.0%	MEBENDAZ:100MG/TAB:T	100	5	5	0.0058	0.0290	0.0290
												Average Episode Drug Cost			1.717

Note:

Antenatal Care											Calculation based on:	Int'l Med ($		
Note	Level of Care	Supply Item	Name of Associated Drugs (if IM or IV)	Quantity/ Admin.	# Admins	Total Quantity	% Cases Treated	Supply Pack Size	Dispensing Unit	Total Disp Units	Median Supply Unit Cost	Cost per Episode	Wgtd. Avg. Tx. Cost
	1	antenatal record		1	1	1	100.0%	1 each	1	1	0.1000	0.1000	0.1000
Tetanus immuni	1	syringe and needle, 2cc	tetanus toxoid	1	2	2	100.0%	box of 100	0.01	2	0.0484	0.0968	0.0968
Per country policy													
Syphilis screeni	1	RPR test kit		1	1	1	100.0%	1 each	1	1	0.7500	0.7500	0.7500
										Average Episode Supply Cost			0.947
Source:										Average Episode Total Cost			2.66

Safe Delivery & Postpartum Care				Home Category:	Normal Delivery							Normative Model			
	Expected Cases:	0										Calculation based on:		Int'l Med ($)	
Note	Level of Care	Drug	Route	Treatment Dose	Unit	Times/ Day	# Days	% Cases Treated	Drug Formulation	Quantity per Unit	Units Per Dose	Total Units	Median Unit Cost	Cost per Episode	Wgtd. Avg. Tx. Cost
	1	OXYTOCIN	IM	10 IU	amp	1	1	100.0%	OXYTOCIN:10IU/ML:1/AMP:	10	1	1	0.1196	0.1196	0.1196
	1	PARACETAMOL	PO	500 mg	tablet	4	3	100.0%	PARACET:500MG/TAB:TAB	500	1	12	0.0030	0.0360	0.0360
	1	SILVER NITRATE	OPHT	0.5 ml	bottle	1	1	100.0%	SILVRNIT:1%/ML:10/BOT:EY	10	0.05	0.05	1.5600	0.0780	0.0780
	1	FERROUS SALT	PO	200 mg	tablet	1	120	100.0%	FESALTFOLIC:200MG/TAB:	200	1	120	0.0024	0.2880	0.2880
	1	VIT A	PO	60 mg	tablet	1	1	100.0%	VITA:60MG/TAB:TAB	60	1	1	0.0207	0.0207	0.0207
												Average Episode Drug Cost			0.542
	Note:														
Safe Delivery & Postpartum Care												Calculation based on:		Int'l Med ($	
Note	Level of Care	Supply Item	Name of Associated Drugs (if IM or IV)		Quantity Admin.	$ Admins	Total Quantity	% Cases Treated	Supply Pack Size	Dispensing Unit	Total Disp. Units	Median Supply Unit Cost	Cost per Episode	Wgtd. Avg. Tx. Cost	
	1	syringe and needle, 2cc	oxytocin		1	1	1	100.0%	box of 100	0.01	1	0.0484	0.0484	0.0484	
	1	soap, 110g bar			1	1	1	100.0%	1 each	1	1	0.1400	0.1400	0.1400	
	1	cord ties, 20cm			1	1	1	100.0%	roll of 100	0.01	1	0.0336	0.0336	0.0336	
	1	chroline tablet			1	1	1	100.0%	1 each	1	1	0.0110	0.0110	0.0110	
	1	gloves, sterile			4	1	4	100.0%	1 pair	1	4	0.2500	1.0000	1.0000	
	1	plastic sheet			1	1	1	100.0%	0.9 m x 1.8 m	1	1	1.8600	1.8600	1.8600	
	1	gauze swabs			1	1	1	100.0%	pack of 20	0.05	1	0.0635	0.0635	0.0635	
	1	partograph			1	1	1	100.0%	1 each	1	1	1.0000	1.0000	1.0000	
												Average Episode Supply Cost			4.157
Source:												Average Episode Total Cost			4.70

Neonatal Sepsis				Hom Category: Treatment of Complications									Normative Model			
		Expected Cases:	0										Calculation based on:		Int'l Med ($)	
Note	Level of Care	Drug	Route	Treatment Dose		Unit	Times/ Day	# Days	% Cases Treated	Drug Formulation	Quantity per Unit	Units Per Dose	Total Units	Median Unit Cost	Cost per Episode	Wgtd. Avg. Tx. Cost
	3	AMPICILLIN	IV/IM	62.5	mg	vial	2	7	100.0%	AMPICILL:500MG/VIAL:INJ	500	0.125	1.75	0.1200	0.2100	0.2100
	3	GENTAMICIN SULFATE	IV/IM	6.25	mg	amp	2	7	100.0%	GENTAMIC:40MG/ML:2/AM	80	0.078125	1.09375	0.0530	0.0580	0.0580
	3	DEXTROSE	IV	250	ml	bottle	1	3	100.0%	DEXTROSE:10%/ML:1000/	1000	0.25	0.75	0.7192	0.5394	0.5394
First aid before referral	1	AMPICILLIN	IV/IM	62.5	mg	vial	1	1	100.0%	AMPICILL:500MG/VIAL:INJ	500	0.125	0.125	0.1200	0.0150	0.0150
													Average Episode Drug Cost			0.822
	Note:															
Neonatal Sepsis													Calculation based on: Int'l Med ($			
Note	Level of Care	Supply Item	Name of Associated Drugs (if IM or IV)			Quantity Admin.	# Admins	Total Quantity	% Cases Treated	Supply Pack Size	Dispensing Unit	Total Disp. Units	Median Supply Unit Cost	Cost per Episode	Wgtd. Avg. Tx. Cost	
	3	syringe and needle, 2cc	ampicillin			1	14	14	100.0%	box of 100	0.01	14	0.0484	0.6776	0.6776	
	3	syringe and needle, 2cc	gentamicin			1	14	14	100.0%	box of 100	0.01	14	0.0484	0.6776	0.6776	
	3	IV set	dextrose 10%			1	1	1	100.0%	1 each	1	1	0.3500	0.3500	0.3500	
First aid before referral	2	syringe and needle, 2cc	ampicillin			1	1	1	100.0%	box of 100	0.01	1	0.0484	0.0484	0.0484	
													Average Episode Supply Cost			1.754
Source:																
	Ampicillin and gentamicin need to be given separately, or they will interact with each other.												Average Episode Total Cost			2.58
	Dose based on a 2.5 kg neonate. Ampicillin is 50mg/kg/day in 2 doses, and gentamicin 5mg/kg/day in 2 doses.															
	The plan is for 2 days IV and then remaining 12 days as IM. IV fluid is estimated at 250ml/day for 2 days.															

Maternal Sepsis			Home	Category:	Treatment of Complications							Normative Model			
		Expected Cases:	0									Calculation based on:		Int'l Med ($)	
Note	Level of Care	Drug	Route	Treatment Dose	Unit	Time of Day	# Days	% Cases Treated	Drug Formulation	Quantity per Unit	Units Per Dose	Total Units	Median Unit Cost	Cost per Episode	Wgtd. Avg. Tx. Cost
Postpartum	3	AMPICILLIN	IVIM	500	mg	visit	4	4	90.00%	AMPICILL:500MG/VIAL;INJ	500	1	16	0.1200	1.9200	1.7280
Breastfeeding	3	AMPICILLIN	PO	500	mg	tablet	4	6	90.00%	AMPICILL:500MG/TAB;TAB	500	1	24	0.0380	0.9120	0.8208
	3	GENTAMICIN SULFATE	IVIM	80	mg	amp	3	10	90.00%	GENTAMIC:40MG/ML;VIAM	200	0.4	12	0.0024	0.0288	0.0259
	3	METRONIDAZOLE	PO	500	mg	tablet	4	10	90.00%	METRONID:250MG/TAB;TA	250	2	80	0.0047	0.3760	0.3384
Initial fluid	3	SODIUM CHLORIDE	IV	1000	ml	bottle	1	1	90.00%	SODCHL:1000ML;VIAL;IV	1000	1	1	1.1000	1.1000	0.9900
	3	SODIUM CHLORIDE	IV	1000	ml	bottle	3	4	90.00%	SODCHL:1000ML;VIAL;IV	1000	1	12	1.1000	13.2000	11.8800
First aid before referral	1	AMPICILLIN	PO	3000	mg	tablet	1	1	90.00%	AMPICILL:500MG/TAB;TAB	500	6	6	0.0380	0.2280	0.2052
Postabortion	3	AMPICILLIN	IVIM	500	mg	visit	4	4	10.00%	AMPICILL:500MG/VIAL;INJ	500	1	16	0.1200	1.9200	0.1920
	3	GENTAMICIN SULFATE	IVIM	80	mg	amp	3	4	10.00%	GENTAMIC:40MG/ML;VIAM	200	0.4	4.8	0.0024	0.0115	0.0012
	3	METRONIDAZOLE	PO	500	mg	tablet	4	4	10.00%	METRONID:250MG/TAB;TA	250	2	32	0.0047	0.1504	0.0150
Initial fluid	3	SODIUM CHLORIDE	IV	1000000%	ml	bottle	1	1	10.00%	SODCHL:1000ML;VIAL;IV	1000	1	1	1.1000	1.1000	0.1100
	3	SODIUM CHLORIDE	IV	1000	ml	bottle	3	4	10.00%	SODCHL:1000ML;VIAL;IV	1000	1	12	1.1000	13.2000	1.3200
On discharge	3	DOXYCYCLINE HCL	PO	100	mg	tablet	2	14	10.00%	DOXYCYCL:100MG/TAB;T	100	1	28	0.0123	0.3444	0.0344
first aid before referral	1	AMPICILLIN	PO	3000	mg	tablet	1	1	10.00%	AMPICILL:500MG/TAB;TAB	500	6	6	0.0380	0.2280	0.0228
												Average Episode Drug Cost			17.684

Note:

Maternal Sepsis											Calculation based on:	Int'l Med ($		
Note	Level of Care	Supply Item	Name of Associated Drugs (if IM or IV)	Quantity Admin.	# Admins	Total Quantity	% Cases Treated	Supply Pack Size	Dispensing Unit	Total Disp Units	Median Supply Unit Cost	Cost per Episode	Wgtd. Avg. Tx. Cost
Postpartum	3	syringe and needle, 2cc	ampicillin	1	16	16	90.00%	box of 100	0.01	16	0.0484	0.7744	0.6970
	3	syringe and needle, 2cc	gentamicin	1	30	30	90.00%	box of 100	0.01	30	0.0484	1.4520	1.3068
	3	IV set	sodium chloride	1	3	3	90.00%	1 each	1	3	0.3500	1.0500	0.9450
Postabortion	3	syringe and needle, 2cc	ampicillin	1	16	16	10.00%	box of 100	0.01	16	0.0484	0.7744	0.0774
	3	syringe and needle, 2cc	gentamicin	1	12	12	10.00%	box of 100	0.01	12	0.0484	0.5808	0.0581
	3	IV set	sodium chloride	1	3	3	10.00%	1 each	1	3	0.3500	1.0500	0.1050
										Average Episode Supply Cost			3.189
Source:										Average Episode Total Cost			20.87

Endometritis				Hom Category:	Treatment of Complications							Normative Model			
		Expected Cases:	0									Calculation based on:		Int'l Med ($)	
Note	Level of Care	Drug	Route	Treatment Dose	Unit	Times/ Day	# Days	% Cases Treated	Drug Formulation	Quantity per Unit	Units Per Dose	Total Units	Median Unit Cost	Cost per Episode	Wgtd. Avg. Tx. Cost
Postpartum	1	AMPICILLIN	PO	500 mg	tablet	4	7	100.0%	AMPICILL:500MG/TAB:TAE	500	1	28	0.0380	1.0640	1.0640
breastfeeding	1	PARACETAMOL	PO	500 mg	tablet	3	2	100.0%	PARACET:500MG/TAB:TAE	500	1	6	0.0030	0.0180	0.0180
or															
Postabortion															
												Average Episode Drug Cost			1.082
	Note:	Assumes woman can take fluids and is not septic.													
Endometritis												Calculation based on:		Int'l Med ($	
Note	Level of Care	Supply Item	Name of Associated Drugs (if IM or IV)		Quantity Admin.	# Admins	Total Quantity	% Cases Treated	Supply Pack Size	Dispensing Unit	Total Disp Units	Median Supply Unit Cost	Cost per Episode	Wgtd. Avg. Tx. Cost	
												Average Episode Supply Cost			
Source:															
												Average Episode Total Cost			1.08

Mastitis				Hom	ategory:	Treatment of Complications							Normative Model			
		Expected Cases:	0										Calculation based on:		Int'l Med ($)	
Note	Level of Care	Drug	Route	Treatment Dose		Unit	Times/ Day	# Days	% Cases Treated	Drug Formulation	Quantity per Unit	Units Per Dose	Total Units	Median Unit Cost	Cost per Episode	Wgtd. Avg. Tx. Cost
Mild case	1	AMPICILLIN	PO	500	mg	tablet	4	5	90.0%	AMPICILL:500MG/TAB:T	500	1	20	0.0380	0.7600	0.6840
	1	PARACETAMOL	PO	500	mg	tablet	3	2	90.0%	PARACET:500MG/TAB:T	500	1	6	0.0030	0.0180	0.0162
Severe case	2	PENICILLIN,PROCA.BENZYI	IM	1	MU	vial	1	4	10.0%	PENPROC:4MU/VIAL:INJ	4	0.25	1	0.3622	0.3622	0.0362
	2	PARACETAMOL	PO	500	mg	tablet	3	2	10.0%	PARACET:500MG/TAB:T	500	1	6	0.0030	0.0180	0.0018
														Average Episode Drug Cost		0.738
	Note:	Assumes 90% of cases are not severe and can be treated at the lowest level of facilities.														
Mastitis													Calculation based on:		Int'l Med ($	
Note	Level of Care	Supply Item	Name of Associated Drugs (if IM or IV)			Quantity/ Admin.	# Admins	Total Quantity	% Cases Treated	Supply Pack Size	Dispensing Unit	Total Disp. Units	Median Supply Unit Cost	Cost per Episode	Wgtd. Avg. Tx. Cost	
Severe case	2	syringe and needle, 2cc	procaine penicillin			1	4	4	10.0%	box of 100	0.01	4	0.0484	0.1936	0.0194	
													Average Episode Supply Cost			0.019
Source:													Average Episode Total Cost			0.76

UTI				Home Category:	Treatment of Complications							Normative Model			
		Expected Cases:	0									Calculation based on:		Int'l Med ($)	
Note	Level of Care	Drug	Route	Treatment Dose	Unit	Times/ Day	# Days	% Cases Treated	Drug Formulation	Quantity per Unit	Units Per Dose	Total Units	Median Unit Cost	Cost per Episode	Wgtd. Avg. Tx. Cost
Pregnant, or Breastfeeding	1	AMPICILLIN	PO	500 mg	tablet	4	10	100.0%	AMPICILL:500MG/TAB:TAE	500	1	40	0.0380	1.5200	1.5200
	1	PARACETAMOL	PO	500 mg	tablet	3	2	100.0%	PARACET:500MG/TAB:TAE	500	1	6	0.0030	0.0180	0.0180
													Average Episode Drug Cost		1.538

Note: Assumes all women are pregnant or breastfeeding and can be treated on out-patient basis.

UTI										Calculation based on:	Int'l Med ($		
Note	Level of Care	Supply Item	Name of Associated Drugs (if IM or IV)	Quantity/ Admin.	# Admins	Total Quantity	% Cases Treated	Supply Pack Size	Dispensing Unit	Total Disp Units	Median Supply Unit Cost	Cost per Episode	Wgtd. Avg. Tx. Cost
										Average Episode Supply Cost			
Source: Mid-wives, Ostetricians, Threatre anesthetics										Average Episode Total Cost			1.54

Severe Pre-eclampsia or Eclampsia			Hom Category:	Treatment of Complications								Normative Model			
		Expected Cases:	0									Calculation based on:		Int'l Med ($)	
Note	Level of Care	Drug	Route	Treatment Dose	Unit	Times/ Day	# Days	% Cases Treated	Drug Formulation	Quantity per Unit	Units Per Dose	Total Units	Median Unit Cost	Cost per Episode	Wgtd. Avg. Tx. Cost
Loading dose	3	MAGNESIUM SULFATE	IV	5 g	vial	1	1	100.0%	MAGNESUR:5G/VIAL:INJ	5	1	1	0.4864	0.4864	0.4864
	3	MAGNESIUM SULFATE	IV	1 g	vial	24	2	100.0%	MAGNESUR:5G/VIAL:INJ	5	0.2	9.6	0.4864	4.6694	4.6694
	3	SODIUM CHLORIDE	IV	1000 ml	vial	3	2	100.0%	SODCHL:1000/ML:VIAL:I	1000	1	6	1.1000	6.6000	6.6000
Piggyback	3	SODIUM CHLORIDE	IV	1000 ml	vial	1	2	100.0%	SODCHL:1000/ML:VIAL:I	1000	1	2	1.1000	2.2000	2.2000
First aid	1	DIAZEPAM	IV/IM	20 mg	amp	1	1	100.0%	DIAZEPAM:5MG/ML:2/AM	10	2	2	0.0806	0.1612	0.1612
												Average Episode Drug Cost			14.117
	Note:														
Severe Pre-eclampsia or Eclampsia												Calculation based on: Int'l Med ($			
Note	Level of Care	Supply Item	Name of Associated Drugs (if IM or IV)		Quantity/ Admin.	# Admins	Total Quantity	% Cases Treated	Supply Pack Size	Dispensing Unit	Total Disp. Units	Median Supply Unit Cost	Cost per Episode	Wgtd. Avg. Tx. Cost	
	3	urine dipsticks	check 6 times/day for 2 days		1	12	12	100.0%	bottle of 100	0.01	12	0.0332	0.3984	0.3984	
	3	syringe, 20cc	magnesium sulfate		1	4	4	100.0%	1 each	1	4	0.9300	3.7200	3.7200	
	3	IV set	2nd for piggy back magnesium		2	1	2	100.0%	1 each	1	2	0.3500	0.7000	0.7000	
	3	foley catherter			1	1	1	100.0%	roll of 100	0.01	1	0.0336	0.0336	0.0336	
	3	urine bag			1	1	1	100.0%	1 each	1	1	0.2900	0.2900	0.2900	
First aid	1	syringe and needle, 2cc	diazepam		1	1	1	100.0%	box of 100	0.01	1	0.0484	0.0484	0.0484	
												Average Episode Supply Cost			5.190
Source:															
												Average Episode Total Cost			19.31

Incomplete Abortion			Hom Category:	Treatment of Complications								Normative Model			
		Expected Cases:	0									Calculation based on:		Int'l Med ($)	
Note	Level of Care	Drug	Route	Treatment Dose	Unit	Times/ Day	# Days	% Cases Treated	Drug Formulation	Quantity per Unit	Units Per Dose	Total Units	Median Unit Cost	Cost per Episode	Wgtd. Avg. Tx. Cost
	2	LIDOCAINE HCL	SC	10 ml	vial	1	1	100.0%	LIDOC:1%/ML:50/VIAL:IN	50	0.2	0.2	0.4500	0.0900	0.0900
	2	PARACETAMOL	PO	500.00 mg	tablet	3	2	100.0%	PARACET:500MG/TAB:T	500	1	6	0.0030	0.0180	0.0180
												Average Episode Drug Cost			0.108
	Note:	Assumes all cases are managed with MVA. For the management of sepsis, refer to the treatment sheet for maternal sepsis.													
Incomplete Abortion												Calculation based on:		Int'l Med ($)	
Note	Level of Care	Supply Item	Name of Associated Drugs (if IM or IV)		Quantity Admin.	# Admins	Total Quantity	% Cases Treated	Supply Pack Size	Dispensing Unit	Total Disp Units	Median Supply Unit Cost	Cost per Episode	Wgtd. Avg. Tx. Cost	
	2	gauze swabs			2	2	4	100.0%	pack of 20	0.05	4	0.0635	0.2540	0.2540	
	2	syringe, 20cc	lidocaine		1	1	1	100.0%	1 each	1	1	0.9300	0.9300	0.9300	
	2	syringe and needle, 2cc	lidocaine		1	1	1	100.0%	box of 100	0.01	1	0.0484	0.0484	0.0484	
	2	gloves, sterile			1	1	1	100.0%	1 pair	1	1	0.2500	0.2500	0.2500	
	2	silicone for lubrication			0.1	1	0	100.0%	bottle of 5 ml	1	0.1	1.3500	0.1350	0.1350	
	2	iodophor			1	1	1	100.0%	1 each	1	1	1.0000	1.0000	1.0000	
												Average Episode Supply Cost			2.617
Source:												Average Episode Total Cost			2.73

Dysfunctional Labor			Hom	Category:	Treatment of Complications							Normative Model			
		Expected Cases:	0									Calculation based on:		Int'l Med ($)	
Note	Level of Care	Drug	Route	Treatment Dose	Unit	Times/ Day	# Days	% Cases Treated	Drug Formulation	Quantity per Unit	Units Per Dose	Total Units	Median Unit Cost	Cost per Episode	Wgtd. Avg. Tx. Cost
	3	OXYTOCIN	IV	10 IU	amp	1	1	100.0%	OXYTOCIN:10IU/ML:1/AN	10	1	1	0.1196	0.1196	0.1196
	3	SODIUM CHLORIDE	IV	1000 ml	bottle	3	1	100.0%	SODCHL:1000/ML:VIAL:1	1000	1	3	1.1000	3.3000	3.3000
Piggyback	3	SODIUM CHLORIDE	IV	1000 ml	bottle	1	1	100.0%	SODCHL:1000/ML:VIAL:1	1000	1	1	1.1000	1.1000	1.1000
												Average Episode Drug Cost			4.520

	Note:														
Dysfunctional Labor											Calculation based on:		Int'l Med ($)		
Note	Level of Care	Supply Item	Name of Associated Drugs (if IM or IV)	Quantity Admin.	# Admins	Total Quantity	% Cases Treated	Supply Pack Size	Dispensing Unit	Total Disp Units	Median Supply Unit Cost	Cost per Episode	Wgtd. Avg. Tx. Cost		
	3	IV set	2nd for piggyback oxytocin drip	1	2	2	100.0%	1 each	1	2	0.3500	0.7000	0.7000		
	3	syringe and needle, 2cc	oxytocin	1	1	1	100.0%	box of 100	0.01	1	0.0484	0.0484	0.0484		
											Average Episode Supply Cost			0.748	
Source:											Average Episode Total Cost			5.27	

Lacerations			Hom Category:	Treatment of Complications								Normative Model			
		Expected Cases:	0									Calculation based on:		Int'l Med ($)	
Note	Level of Care	Drug	Route	Treatment Dose	Unit	Times/ Day	# Days	% Cases Treated	Drug Formulation	Quantity per Unit	Units Per Dose	Total Units	Median Unit Cost	Cost per Episode	Wgtd. Avg. Tx. Cost
	1	LIDOCAINE HCL	SC	10 ml	vial	1	1	100.0%	LIDOC:1%/ML:50/VIAL:INJ	50	0.2	0.2	0.4500	0.0900	0.0900
	1	PARACETAMOL	PO	500 mg	tablet	3	2	100.0%	PARACET:500MG/TAB:TA	500	1	6	0.0030	0.0180	0.0180
													Average Episode Drug Cost		0.108
	Note:	Assumes simple repairs could be done at the first level facilities.													

Lacerations											Calculation based on:	Int'l Med ($		
Note	Level of Care	Supply Item	Name of Associated Drugs (if IM or IV)	Quantity Admin.	# Admins	Total Quantity	% Cases Treated	Supply Pack Size	Dispensing Unit	Total Disp. Units	Median Supply Unit Cost	Cost per Episode	Wgtd. Avg. Tx. Cost
	1	syringe and needle, 2cc	lidocaine	1	1	1	100.0%	box of 100	0.01	1	0.0484	0.0484	0.0484
	1	sutures and needle		2	1	2	100.0%	pack of 6	0.16	2	0.2400	0.4800	0.4800
	1	gauze swabs		1	1	1	100.0%	pack of 20	0.05	1	0.0635	0.0635	0.0635
	1	gloves, sterile		1	1	1	100.0%	1 pair	1	1	0.2500	0.2500	0.2500
											Average Episode Supply Cost		0.842
Source:													
											Average Episode Total Cost		0.95

C-Section			Home	Category:	Treatment of Complications							Normative Model			
		Expected Cases:	0									Calculation based on:		Int'l Med ($)	
Note	Level of Care	Drug	Route	Treatment Dose	Unit	Times/ Day	# Days	% Cases Treated	Drug Formulation	Quantity per Unit	Units Per Dose	Total Units	Median Unit Cost	Cost per Episode	Wgtd. Avg. Tx. Cost
	3	THIOPENTAL	IV	0.5 g	vial	1	1	100.0%	THIOPENT:1GM/VIAL:IN	1	0.5	0.5	0.6820	0.3410	0.3410
	3	ATROPINE SULFATE	IV	0.25 mg	amp	1	1	100.0%	ATROPINE:0.25MG/ML:1	0.25	1	1	0.0688	0.0688	0.0688
	3	SUXAMETHONIUM CL	IV	50 mg	amp	1	1	100.0%	SUXAMETH:50MG/ML:1/	50	1	1	0.0548	0.0548	0.0548
	3	KETAMINE	IV	10 mg	amp	1	1	100.0%	KETAMINE:10MG/ML:20/	10	1	1	0.5720	0.5720	0.5720
	3	PARACETAMOL	PO	500 mg	tablet	3	2	100.0%	PARACET:500MG/TAB:T	500	1	6	0.0030	0.0180	0.0180
	3	SODIUM CHLORIDE	IV	1000 ml	bottle	3	2	100.0%	SODCHL:1000/ML:VIAL:I	1000	1	6	1.1000	6.6000	6.6000
Spinal anesthes	3	LIDOCAINE HCL	spinal	0.075 ml	vial	1	1	100.0%	LIDOC:1%/ML:50/VIAL:IN	50	0.0015	0.0015	0.4500	0.0007	0.0007
	3	SODIUM CHLORIDE	IV	1000 ml	bottle	3	2	100.0%	SODCHL:1000/ML:VIAL:I	1000	1	6	1.1000	6.6000	6.6000
	3	PARACETAMOL	PO	500 mg	tablet	3	2	100.0%	PARACET:500MG/TAB:T	500	1	6	0.0030	0.0180	0.0180
												Average Episode Drug Cost			14.273
	Note:														
C-Section												Calculation based on:		Int'l Med ($	
Note	Level of Care	Supply Item	Name of Associated Drugs (if IM or IV)		Quantity Admin.	# Admins	Total Quantity	% Cases Treated	Supply Pack Size	Dispensing Unit		Total Disp. Units	Median Supply Unit Cost	Cost per Episode	Wgtd. Avg. Tx. Cost
	3	towel clips			6	1	6	100.0%	1 each	1		6	1.0200	6.1200	6.1200
	3	surgical knife blades			2	1	2	100.0%	1 each	1		2	2.0000	4.0000	4.0000
	3	triangular point suture with needle, 7.3 cm, size 6			2	1	2	100.0%	set of 6	0.16		2	0.2096	0.4192	0.4192
	3	round-bodied needle, No.12, size 6			2	1	2	100.0%	pack of 6	0.16		2	0.2320	0.4640	0.4640
	3	IV set	sodium chloride		1	1	1	100.0%	1 each	1		1	0.3500	0.3500	0.3500
	3	foley catheter			1	1	1	100.0%	1 each	1		1	0.6100	0.6100	0.6100
	3	urine bag			1	1	1	100.0%	1 each	1		1	0.2900	0.2900	0.2900
Spinal anesthes	3	IV set	sodium chloride		1	1	1	100.0%	1 each	1		1	0.3500	0.3500	0.3500
	3	spinal needle, 18-25 gauge	lidocaine		1	1	1	100.0%	1 each	1		1	0.9900	0.9900	0.9900
	3	foley catheter			1	1	1	100.0%	1 each	1		1	0.6100	0.6100	0.6100
	3	urine bag			1	1	1	100.0%	1 each	1		1	0.2900	0.2900	0.2900
												Average Episode Supply Cost			14.493
Source:												Average Episode Total Cost			28.77

Postpartum Hemorrhage			Hom Category:	Treatment of Complications								Normative Model			
		Expected Cases:	0									Calculation based on:		Int'l Med ($)	
Note	Level of Care	Drug	Route	Treatment Dose	Unit	Times/ Day	# Days	% Cases Treated	Drug Formulation	Quantity per Unit	Units Per Dose	Total Units	Median Unit Cost	Cost per Episode	Wgtd. Avg. Tx. Cost
	1	OXYTOCIN	IV/IM	30	IU	amp	2	1	100.0%	OXYTOCIN:10IU/ML:1/AM	10	3	6	0.1196	0.7176	0.7176
	1	SODIUM CHLORIDE	IV/IM	1000	ml	bottle	4	2	100.0%	SODCHL:1000/ML:VIAL:1	1000	1	8	1.1000	8.8000	8.8000
	1	FERROUS SALT	PO	400	mg	tablet	1	120	100.0%	FESALTFOLIC:200MG/TA	200	2	240	0.0024	0.5760	0.5760
	1	ERGOMETRINE MALEATE	PO	0.125	mg	tablet	3	3	100.0%	ERGOMAL:0.125MG/TAB	0.125	1	9	0.0138	0.1242	0.1242
												Average Episode Drug Cost			10.218

Note: Use parenteral oxytocin rather than parenteral ergometrine because a study found that ergometrine was unstable in tropical countries (see the reference below).

Postpartum Hemorrhage										Calculation based on:		Int'l Med ($	
Note	Level of Care	Supply Item	Name of Associated Drugs (if IM or IV)	Quantity Admin.	# Admins	Total Quantity	% Cases Treated	Supply Pack Size	Dispensing Unit	Total Disp. Units	Median Supply Unit Cost	Cost per Episode	Wgtd. Avg. Tx. Cost
	1	IV set	sodium chloride	1	1	1	100.0%	1 each	1	1	0.3500	0.3500	0.3500
	1	syringe and needle, 2cc	oxytocin	1	2	2	100.0%	box of 100	0.01	2	0.0484	0.0968	0.0968
	2	unit of blood		1	1	1	100.0%	1 each	1	1	31.0000	31.0000	31.0000
										Average Episode Supply Cost			31.447
Source:										Average Episode Total Cost			41.66

Syphilis				Home *Category:*	**STDs**							**Normative Model**			
		Expected Cases:	0									**Calculation based on:**		**Int'l Med ($)**	
Note	**Level of Care**	**Drug**	**Route**	**Treatment Dose**	**Unit**	**Times/ Day**	**# Days**	**% Cases Treated**	**Drug Formulation**	**Quantity per Unit**	**Units Per Dose**	**Total Units**	**Median Unit Cost**	**Cost per Episode**	**Wgtd. Avg. Tx. Cost**
First line	1	PENICILLIN,BENZA.BENZ	IM	2.4	MU	vial	1	1	95.0%	PENBENZ:2.4MU/VIAL:IN	2.4	1	1	0.2650	0.2650	0.2518
	1	WATER FOR INJECTION	IM	5	ml	vial	1	1	95.0%	WATERINJ:1DOS/ML:10/	10	0.5	0.5	0.0280	0.0140	0.0133
Penicillin allerg	3	ERYTHROMYCIN	PO	500	mg	tablet	4	15	5.0%	ERYTHROM:250MG/TAB	250	2	120	0.0365	4.3800	0.2190
														Average Episode Drug Cost		**0.484**

	Note:														
Syphilis											**Calculation based on:**		**Int'l Med ($**		
Note	**Level of Care**	**Supply Item**	**Name of Associated Drugs (if IM or IV)**	**Quantity Admin.**	**$ Admins**	**Total Quantity**	**% Cases Treated**	**Supply Pack Size**	**Dispensing Unit**	**Total Disp. Units**	**Median Supply Unit Cost**	**Cost per Episode**	**Wgtd. Avg. Tx. Cost**		
	1	RPR test kit		1	1	1	100.0%	1 each	1	1	0.7500	0.7500	0.7500		
First line	1	syringe and needle, 5cc	benzathine penicillin G	1	2	2	100.0%	box of 100	0.01	2	0.0484	0.0968	0.0968		
											Average Episode Supply Cost				**0.847**
Source:															
	Give benzathine penicillin in two divided doses due to the volume.										**Average Episode Total Cost**				**1.33**
	Assumes early syphilis treatment is adequate.														
	Treat woman and one partner.														

Gonorrhea/Chlamydia			Hom	Category:	STDs							Normative Model			
		Expected Cases:	0									Calculation based on:		Int'l Med ($)	
Note	Level of Care	Drug	Route	Treatment Dose	Unit	Times/ Day	# Days	% Cases Treated	Drug Formulation	Quantity per Unit	Units Per Dose	Total Units	Median Unit Cost	Cost per Episode	Wgtd. Avg. Tx. Cost
Pregnant, or Breastfeeding	1	CEFIXIME	PO	400 mg	tablet	1	1	90.0%	CEFIXIME:200MG/TAB:T	200	2	2	2.3500	4.7000	4.2300
	1	ERYTHROMYCIN	PO	500 mg	tablet	4	7	90.0%	ERYTHROM:250MG/TAB	250	2	56	0.0365	2.0440	1.8396
Not pregnant	1	CIPROFLOXCIN	PO	500 mg	tablet	1	1	10.0%	CIPROFLX:500MG/TAB:T	500	1	1	0.0694	0.0694	0.0069
	1	DOXYCYCLINE HCL	PO	100 mg	tablet	2	7	10.0%	DOXYCYCL:100MG/TAB	100	1	14	0.0123	0.1722	0.0172
												Average Episode Drug Cost			6.094

Note:

Gonorrhea/Chlamydia											Calculation based on:	Int'l Med ($)		
Note	Level of Care	Supply Item	Name of Associated Drugs (if IM or IV)	Quantity/ Admin.	# Admins	Total Quantity	% Cases Treated	Supply Pack Size	Dispensing Unit	Total Disp. Units	Median Supply Unit Cost	Cost per Episode	Wgtd. Avg. Tx. Cost
										Average Episode Supply Cost			
Source:										Average Episode Total Cost			6.09

PID			Home	Category:	STDs							Normative Model			
		Expected Cases:	0									Calculation based on:		Int'l Med ($)	
Note	Level of Care	Drug	Route	Treatment Dose	Unit	Times/ Day	# Days	% Cases Treated	Drug Formulation	Quantity per Unit	Units Per Dose	Total Units	Median Unit Cost	Cost per Episode	Wgtd. Avg. Tx. Cost
Out-patient	1	CEFTRIAXONE	IM	250 mg	vial	1	1	90.0%	CEFTRIAX:250MG/VIAL:1	250	1	1	2.9250	2.925	2.633
	1	DOXYCYCLINE HCL	PO	100 mg	tablet	2	14	90.0%	DOXYCYCL:100MG/TAB	100	1	28	0.0123	0.344	0.310
	1	METRONIDAZOLE	PO	500 mg	tablet	2	14	90.0%	METRONID:250MG/TAB:1	250	2	56	0.0047	0.263	0.237
In-patient	2	CEFTRIAXONE	IM	500 mg	vial	1	5	10.0%	CEFTRIAX:250MG/VIAL:1	250	2	10	2.9250	29.250	2.925
	2	DOXYCYCLINE HCL	PO	100 mg	tablet	2	5	10.0%	DOXYCYCL:100MG/TAB	100	1	10	0.0123	0.123	0.012
	2	METRONIDAZOLE	PO	500 mg	tablet	2	5	10.0%	METRONID:250MG/TAB:1	250	2	20	0.0047	0.094	0.009
O\n discharge	2	DOXYCYCLINE HCL	PO	100 mg	tablet	2	14	10.0%	DOXYCYCL:100MG/TAB	100	1	28	0.0123	0.344	0.034
												Average Episode Drug Cost			6.160

Note: Assumes 90% of cases can be treated on out-patient basis. Assumes severe cases need 5 days of in-patient care followed by 14 days of medications after discharge.

PID											Calculation based on:	Int'l Med ($		
Note	Level of Care	Supply Item	Name of Associated Drugs (if IM or IV)	Quantity Admin.	# Admins.	Total Quantity	% Cases Treated	Supply Pack Size	Dispensing Unit	Total Disp. Units	Median Supply Unit Cost	Cost per Episode	Wgtd. Avg. Tx. Cost
Out-patient	1	syringe and needle, 2cc	ceftriaxone	1	1	1	90.0%	box of 100	0.01	1	0.0484	0.048	0.044
In-patient	2	syringe and needle, 2cc	ceftriaxone	1	5	5	10.0%	box of 100	0.01	5	0.0484	0.242	0.024
										Average Episode Supply Cost			0.068
Source:										Average Episode Total Cost			6.23

Health Worker Equipment Package Home US $1.00 = 1 US $

Equipment Type	# Units	Unit Prices: Local Med	Local Med ($)	Int'l Med ($)	Reference or Catalog #	Calc. Price	Total Price
sphygmomanometer	1		-	30.11		30.110	30.110
stethoscope	1		-	4.65		4.650	4.650
stethoscope fetal pinard	1		-	1.23		1.230	1.230
tape measure	1		-	0.49		0.490	0.490
thermometer	1		-	0.65		0.650	0.650
gestational wheel	1		-			-	-
			-			-	-
			-			-	-
			-			-	-
			-			-	-
			-			-	-
			-			-	-
			-			-	-
			-			-	-
			-			-	-
			-			-	-
			-			-	-
			-			-	-
			-			Total Cost	37.130

Delivery Room Equipment Package Home US $1.00 = 1 US $

Equipment Type	Price Used	Labor/Delivery Unit: # Units	Total Price	Antenatal/Postnatal Unit: # Units	Total Price	Local Unit Price: Local Med	Local Med ($)	Int'l Med ($)	Ref or Catalog #
baby scale	60.500	1	60.500		-		-	60.500	
spring type dressing forceps (st	1.020	3	3.060		-		-	1.020	
kidney basin (stainless steel)	1.660	3	4.980		-		-	1.660	
sponge bowls (stainless steel)	1.750	3	5.250		-		-	1.750	
surgeon's hand brish with white	0.570	3	1.710		-		-	0.570	
towels	1.430	3	4.290		-		-	1.430	
Kelley clamps	1.560	3	4.680		-		-	1.560	
cord-cuttingblunt-ended scissor	1.720	6	10.320		-		-	1.720	
Delee suction	1.280	3	3.840		-		-	1.280	
baby ambu bag	172.560	1	172.560		-		-	172.560	
	-		-		-		-		
Instrumental Delivery Equipment	-		-		-		-		
obstetric forceps, Simpson-Braus	33.510	3	100.530		-		-	33.510	
manual hand-operated vacuum e	530.640	1	530.640		-		-	530.640	
placenta forceps, Corey	6.170	3	18.510		-		-	6.170	
tissue forceps, Allis	2.630	3	7.890		-		-	2.630	
	-		-		-		-		
	-		-		-		-		
	-		-		-		-		
	-		-		-		-		
	-		-		-		-		
	-		-		-		-		
	-		-		-		-		
	-		-		-		-		
	-		-		-		-		
	-		-		-		-		
	-		-		-		-		
	-		-		-		-		
	-		-		-		-		
	-		-		-		-		
		Total Cost	928.760	Total Cost	-				

MVA and Lacerations Repair Equipment — US $1.00 = 1 US $

Equipment Type	Price Used	# Units	Total Cost	Unit Price: Local Med	Local Med ($)	Int'l Med ($)	Ref or Catalog #
sponge forceps, 200 mm	3.280	3	9.840		-	3.280	
artery forceps, large 160 mm	2.270	3	6.810		-	2.270	
artery forceps, small 140 mm	1.720	3	5.160		-	1.720	
needle holder, 180 mm	2.790	6	16.740		-	2.790	
stitch scissors	2.670	6	16.020		-	2.670	
dissecting forceps, toothed 200 mm	3.280	6	19.680		-	3.280	
vaginal speculum, large, Sims, #3SS	2.890	3	8.670		-	2.890	
vaginal speculum, Hamilton Bailey, bi-valve,	3.600	3	10.800		-	3.600	
sponge ring forceps or uterine forceps	3.280	3	9.840		-	3.280	
vaginal speculum	3.680	3	11.040		-	3.680	
single tooth tenaculum forceps	4.030	3	12.090		-	4.030	
long dissecting forceps	5.760	3	17.280		-	5.760	
vacuum syringes (single or double valve)	2.500	3	7.500		-	2.500	
flexible cannulae, 4 mm	1.190	3	3.570		-	1.190	
flexible cannulae, 5 mm	1.210	3	3.630		-	1.210	
flexible cannulae, 6 mm	1.180	3	3.540		-	1.180	
light source (lamp)	411.090	1	411.090		-	411.090	
	-		-		-		
	-		-		-		
	-		-		-		
	-		-		-		
	-		-		-		
	-		-		-		
	-		-		-		
			573.300				

Required for every maternity theatre

C-Section Equipment Package — US $1.00 = 1 US $

Equipment Type	Price Used	# Units: C-Section	# Units: Evacuation			Total # Units	Total Cost	Unit Price: Local Med	Local Med ($)	Int'l Med ($)	Ref or Catalog #
stainless steel instrument tray with cover	5.640	3				3	16.920		-	5.640	
sponge forceps, 200 mm	3.280	18				18	59.040		-	3.280	
straight artery forceps, 16 cm	2.270	12				12	27.240		-	2.270	
uterine hemostatic forceps, 215 mm	3.380	24				24	81.120		-	3.380	
hysterectomy forceps, straight, 22 mm	3.430	12				12	41.160		-	3.430	
mosquito forceps, 12.5 cm	1.710	18				18	30.780		-	1.710	
tissue forceps, 20 cm	3.530	18				18	63.540		-	3.530	
uterine tenaculum forceps, 200 mm	4.030	3				3	12.090		-	4.030	
needle holder, straight, 180 mm	2.790	3				3	8.370		-	2.790	
surgical knife handle, #3	1.850	3				3	5.550		-	1.850	
surgical knife handle, #4	1.920	3				3	5.760		-	1.920	
abdominal retractor, size 3	3.610	6				6	21.660		-	3.610	
abdominal retractor, double-ended, Richard	7.470	6				6	44.820		-	7.470	
curved operating scissors, blunt pointed (Ma	2.390	3				3	7.170		-	2.390	
straight operating scissors, blunt pointed (Ma	2.040	3				3	6.120		-	2.040	
scissors, straight, 145 mm	1.560	3				3	4.680		-	1.560	
suction tube, Yankauer	2.960	3				3	8.880		-	2.960	
dressing forceps, 155 mm	1.020	6				6	6.120		-	1.020	
dressing forceps, 250 mm	1.920	3				3	5.760		-	1.920	
anesthetic face mask	27.000		3			3	81.000		-	27.000	
oropharyngeal airway, 82 mm	11.430		3			3	34.290		-	11.430	
laryngoscopes	75.200		3			3	225.600		-	75.200	
endotracheal tubes with cuffs, 8 mm and 10	26.160		3			3	78.480		-	26.160	
intubating forceps, Magill or ovum forceps	7.010		3			3	21.030		-	7.010	
anesthesia apparatus, draw-over system	3,643.700		1			1	3,643.700		-	3,643.700	
	-					0	-		-		
	-					0	-		-		
	-					0	-		-		
	-					0	-		-		
	-					0	-		-		
	-					0	-		-		
	-					0	-		-		
					Total Cost		4,540.880				

Drug List	Home		Add Drug	Update Drug Lookups			Price Used: Int'l Med ($) International		
Drug	Drug Formulation	Unit	Route	Formulation	Base Dose/Unit		Pack Size	Int'l Med ($)	Unit cost $
AMPICILLIN	AMPICILL:250MG/TAB:TAB	TAB	PO	250MG/TAB	250		1000	20.00	0.0200
AMPICILLIN	AMPICILL:500MG/TAB:TAB	TAB	PO	500MG/TAB	500		1000	38.00	0.0380
AMPICILLIN	AMPICILL:500MG/VIAL:INJ	VIAL	INJ	500MG/VIAL	500		100	12.00	0.1200
ATROPINE SULFATE	ATROPINE:0.25MG/ML:1IAMP:INJ	AMP	INJ	0.25MG/ML/1ML	0.25		100	6.88	0.0688
CEFIXIME	CEFIXIME:200MG/TAB:TAB	TAB	PO	200MG/TAB	200		1	2.35	2.3500
CEFTRIAXONE	CEFTRIAX:250MG/VIAL:INJ	VIAL	INJ	250MG/VIAL	250		1	2.93	2.9250
CHLOROQUINE PHOSPHATE	CHLRQUIN:150MG/TAB:TAB	TAB	PO	150MG/TAB	150		100	0.83	0.0083
CIPROFLOXCIN	CIPROFLX:500MG/TAB:TAB	TAB	PO	500MG/TAB	500		100	6.94	0.0694
DEXTROSE	DEXTROSE:10%ML:1000bottle	BOT	IV	10%ML/1000ML	1000		12	8.63	0.7192
DIAZEPAM	DIAZEPAM:5MG/ML:2AMP:INJ	AMP	INJ	5MG/ML/2ML	10		100	8.06	0.0806
DOXYCYCLINE HCL	DOXYCYCL:100MG/TAB:TAB	TAB	PO	100MG/TAB	100		1000	12.30	0.0123
ERGOMETRINE MALEATE	ERGOMAL:0.125MG/TAB:TAB	TAB	PO	0.125MG/TAB	0.125		100	1.38	0.0138
ERYTHROMYCIN	ERYTHROM:250MG/TAB:TAB	TAB	PO	250MG/TAB	250		1000	36.50	0.0365
FERROUS SALT/FOLIC ACID	FESALTFOLIC:200MG/TAB:TAB	TAB	PO	200/0.25MG/TAB	200		1000	2.40	0.0024
GENTAMICIN SULFATE	GENTAMIC:40MG/ML:2AMP:INJ	AMP	INJ	40MG/ML/2ML	80		100	5.30	0.0530
KETAMINE	KETAMINE:10MG/ML:20VIAL:INJ	VIAL	INJ	10MG/ML/20ML	10		25	14.30	0.5720
LIDOCAINE HCL	LIDOC:1%ML:50VIAL:INJ	VIAL	INJ	1%ML/50ML	50		25	11.25	0.4500
MAGNESIUM SULFATE	MAGNESUR:50MVIAL:INJ	VIAL	INJ	500MG/ML/10ML	5		100	48.64	0.4864
MEBENDAZOLE	MEBENDAZ:100MG/TAB:TAB	TAB	PO	100MG/TAB	100		1000	5.80	0.0058
METRONIDAZOLE	METRONID:250MG/TAB:TAB	TAB	PO	250MG/TAB	250		1000	4.70	0.0047
OXYTOCIN	OXYTOCIN:10IUML:1IAMP:INJ	AMP	INJ	10IUML/1ML	10		100	11.96	0.1196
PARACETAMOL	PARACET:500MG/TAB:TAB	TAB	PO	500MG/TAB	500		1000	3.00	0.0030
PENICILLIN,BENZA.BENZYL	PENBENZ:2.4MUVIAL:INJ	VIAL	INJ	2.4MUVIAL	2.4		50	13.25	0.2650
PENICILLIN,PROCA.BENZYL	PENPROC:4MUVIAL:INJ	VIAL	INJ	4MUVIAL	4		50	18.11	0.3622
SILVER NITRATE	SILVRNIT:1%ML:10BOT:EYE	BOT	EYE	1%ML/10ML	10		1	1.56	1.5600
SODIUM CHLORIDE	SODCHL:100%ML:VIAL:IV	VIAL	IV	100%ML/ML	1000		1	1.10	1.1000
SULFADOXINE/PYRIMETHAMINE	SULFADOX:500MG/TAB:TAB	TAB	PO	500MG/TAB	500		1000	27.20	0.0272
SUXAMETHONIUM CL	SUXAMETH:50MG/ML:1AMP:INJ	AMP	INJ	50MG/ML/1ML	50		100	5.48	0.0548
TETANUS TOXOID VACCINE	TETANUST:1DOSAMP:INJ	AMP	INJ	1DOSAMP	1		20	17.46	0.8730
THIOPENTAL	THIOPENT:1GMVIAL:INJ	VIAL	INJ	1GMVIAL	1		25	17.05	0.6820
VIT A	VITA:60MG/TAB:TAB	TAB	PO	60MG/TAB	60		1000	20.70	0.0207
WATER FOR INJECTION	WATERINJ:1DOSML:10AMP:INJ	AMP	INJ	1DOSML/10ML	10		100	2.80	0.0280

Supply List	Home	Int'l Med ($)	$1.00 =	1 US $				
		INTERNATIONAL						
Item	Int'l Pack Size	Int'l Med ($)	Dispensing Unit	Disp. Unit Cost	Price Used	Ref or Catalog #	Notes	
antenatal record	1 each	0.100	1	0.100	0.100			
chlorine tablet	1 each	0.011	1	0.011	0.011			
cord ties, 20cm	roll of 100	3.360	0.01	0.034	0.034			
foley catheter	1 each	0.610	1	0.610	0.610			
gauze swabs	pack of 20	1.270	0.05	0.064	0.064			
gloves, sterile	1 pair	0.250	1	0.250	0.250			
iodophor	1 each	1.000	1	1.000	1.000			
IV set	1 each	0.350	1	0.350	0.350			
partograph	1 each	1.000	1	1.000	1.000			
plastic sheet	0.9 m x 1.8 m	1.860	1	1.860	1.860			
round-bodied needle, No.12, size 6	pack of 6	1.450	0.16	0.232	0.232			
RPR test kit	1 each	0.750	1	0.750	0.750			
silicone for lubrication	bottle of 5 ml	1.350	1	1.350	1.350			
soap, 110g bar	1 each	0.140	1	0.140	0.140			
spinal needle, 18-25 gauze	1 each	0.990	1	0.990	0.990			
surgical knife blades	1 each	2.000	1	2.000	2.000			
sutures and needle	pack of 6	1.500	0.16	0.240	0.240			
syringe and needle, 2cc	box of 100	4.840	0.01	0.048	0.048			
syringe, 20cc	1 each	0.930	1	0.930	0.930			
towel clips	1 each	1.020	1	1.020	1.020			
triangular point suture with needle	set of 6	1.310	0.16	0.210	0.210			
unit of blood	1 each	31.000	1	31.000	31.000			
urine bag	1 each	0.290	1	0.290	0.290			
urine dipsticks	bottle of 100	3.320	0.01	0.033	0.033			
				-	-			

APPENDIX C. CES SURVEY INSTRUMENTS

- Health Facility Survey Form
- Health Care Practice (with Instructions)
- Patient Contact Form
- Health Care Provider Interview
- Mothers Interview Form
- Pharmacy Survey Form
- Pharmacy Simulated Purchase Survey Form (with Instructions)

Cost-Estimate Strategy (CES) Survey

Cost-Estimate Strategy (CES) Survey

HEALTH FACILITY SURVEY FORM

District:		Health Facility:	
Facility Type: (HO=hospital; HC=health center; DI=dispensary)			
Facility Administration: (G=government; N=nonprofit private; P=for-profit private)			
Date:		Data Collector:	

The study team should hold an introductory meeting with the key members of the hospital staff (medical superintendent, hospital matron, chief supplies officer, chief pharmacist) or with the medical and nursing officers in charge of a lower level facility. At this briefing, explain the purpose of the survey, and assure the staff that its purpose is not to rate their facility. After completing the briefing, explain that you would like to ask some general questions about the facility, its staff, the reproductive health services offered, and recent utilization. The staff may need to assemble the data for Questions 1-6 from a variety of sources.

SERVICES

1. Which of the following services are provided at this facility? *Read and ask about each service separately.*	***Check box*** ☒	
a. Antenatal care	1 Yes	0 No
b. Treatment of STDs	1 Yes	0 No
c. Normal delivery care	1 Yes	0 No
d. Manual vacuum aspiration (MVA)	1 Yes	0 No

2. Which of the following complications can be managed at this facility? *Read and ask about each complication separately.*	***Check box*** ☒	
a. Care for pre-eclampsia	1 Yes	0 No
b. Care for eclampsia	1 Yes	0 No
c. Care for obstructed or prolonged labor	1 Yes	0 No
d. Care for maternal hemorrhage	1 Yes	0 No
e. Cesarean section	1 Yes	0 No
f. Management of abortion complications/incomplete delivery	1 Yes	0 No
g. Care for maternal sepsis	1 Yes	0 No

3. Which of the following laboratory tests are currently performed at this facility? *Read and ask about each lab test separately.*	***Check box*** ☒	
a. Malaria smear	1 Yes	0 No
b. Urine analysis for glucose and protein	1 Yes	0 No
c. Urine culture and sensitivity	1 Yes	0 No
d. Hemoglobin	1 Yes	0 No
e. Blood group typing and RH cross-reactivity	1 Yes	0 No
f. Blood culture and sensitivity	1 Yes	0 No
g. Stool for ova and parasites	1 Yes	0 No

4. How many hours does it take to transfer patients to the nearest referral facility? *Enter number of hours.*	Hours

Request to see the service utilization records for the previous calendar year (based on regular records, logs, or standard forms, for example, the MOH Workload Forms, Inpatient Morbidity Forms, or Outpatient Morbidity Forms). Record the total number of patient consultations during that year for each of the following categories of reproductive health services for which data are available. If annual data are not available for a given condition, enter N/A.

<u>If no data from the previous year are available</u>, calculate the average monthly number of consultations for each condition during the previous three months. Then multiply the average monthly consultations by 12 to estimate the total consultations for one year. Enter N/A if there are no data.

5. Consultations for RH Problems	***Total consultations reported during the previous calendar year***
a. Antenatal care	
b. Deliveries	
c. Cesarean sections	
d. UTI	
e. Syphilis (or GUD)	
f. Gonorrhea/ chlamydia (or vaginal discharge)	
g. PID	

INFRASTRUCTURE AND EQUIPMENT

Province:		District:		Health Facility:	
Date:		Data collector:			

Explain that you would like to see the facilities and equipment used here in providing MCH services. Visit all MCH areas, delivery rooms, maternity theatres, and the laboratory to observe the presence and condition of the following infrastructure and equipment.

Code each item of physical infrastructure based on its condition on the day of the visit:
- ***0 = Not available***
- ***1 = Available but not satisfactory***
- ***2 = Available and satisfactory***

Code as not satisfactory items which in your opinion are not functional, missing parts, unhygienic, or otherwise substandard.

6. Physical Infrastructure	***0 = Not available 1 = Available but not satisfactory 2 = Available and satisfactory***
a. Refrigerator	
b. Functioning laboratory facilities: including microscope, centrifuge, and clean water supply	
c. Functioning delivery room: including bed, linen, lighting, and clean water supply	
d. Functioning operating theatre: including operating table, shadowless lamp, trolley, suction apparatus, anesthesia equipment, oxygen, nitrous oxide, and emergency light	

Next, visit the <u>MCH antenatal clinic</u> in this facility. Count how many of the following items of basic medical equipment are present, and evaluate their condition. Tally the number of each item beside the name of the item as you count, and sum up the total for each item at the end.

Indicate in the appropriate column the number of items that are available <u>and</u> in satisfactory condition. Do not count items which are not functional, missing parts, unhygienic, or otherwise substandard.

After completing all equipment inventories that apply to this facility, ask the administrator to see medical equipment purchasing records for the previous year. If purchasing records are not kept in the health facility, there may be copies in the District Office. For any equipment item purchased <u>during the previous year</u>, record the most recent purchase price. Prices should NOT be estimated, but based on actual recorded values. If no purchases were made, or records cannot be located, leave cells blank.

FOR ALL FACILITIES:		
7. Basic MCH Equipment	***Number available and satisfactory***	***Last purchase price***
gestational wheel		
scale, adult		
scale, baby		
sphygmomanometer		
stethoscope		
stethoscope, fetal		
tape measure		
thermometer		

Next, if this facility handles normal births, visit the labor and delivery area and the maternity ward. Count the following items of equipment needed for normal delivery and evaluate their condition. Tally the number of each item beside the name of the item as you count, and sum up the total for each item at the end.

Indicate in the appropriate column the number of items that are available and in satisfactory condition. Do not count items which are not functional, missing parts, unhygienic, or otherwise substandard.

FOR ALL FACILITIES PERFORMING NORMAL DELIVERIES:		
8. Equipment for Normal Delivery	***Number available and satisfactory***	***Last purchase price***
airway		
ambu bag, baby		
blanket, baby		
bowl, kidney stainless steel 10"		
bowl, 36"		
forceps, artery 8" straight		
gestational wheel		
needle holder 7"		
scale, adult		
scale, baby		
scissors, cord 10 cm		
scissors, episiotomy 12.5 cm		
scrub brush, surgeon' s		
sheet, Macintosh		
speculum, vaginal		

FOR ALL FACILITIES PERFORMING NORMAL DELIVERIES:		
8. Equipment for Normal Delivery (cont'd.)	***Number available and satisfactory***	***Last purchase price***
sphygmomanometer		
stethoscope		
stethoscope, fetal		
suction machine		
tape measure		
thermometer		
tongue blade		
towel, baby drying		

Finally, if this facility handles obstetric surgery, visit the maternity theatre. Be sure to check for equipment that may have been sent to the Central Sterilizing Supply Unit for sterilization. Count the following items of surgical equipment and evaluate their condition. Tally the number of each item beside the name of the item as you count, and sum up the total for each item at the end.

Indicate in the appropriate column the number of items that are present and in satisfactory condition. Do not count items that are not functional, missing parts, unhygienic, or otherwise substandard.

FOR ALL HOSPITALS PERFORMING OBSTETRIC SURGERY:		
9. Hospital Surgical Equipment	***Number available and satisfactory***	***Last purchase price***
airway, sm		
airway, med		
airway, lg		
blade handle (Bard Parker #4)		
boots, nonstatic gum (pair)		
bowl, lg stainless steel		
cannula, Carmans Ipas double valve		
cannula, Carmans Ipas single valve		
cannula, flexible sz 10		
cannula, flexible sz 4		
cannula, flexible sz 5		

FOR ALL HOSPITALS PERFORMING OBSTETRIC SURGERY:		
9. Hospital Surgical Equipment (cont'd.)	***Number available and satisfactory***	***Last purchase price***
cannula, flexible sz 6		
cannula, flexible sz 7		
cannula, flexible sz 8		
cannula, flexible sz 9		
currette, uterine double ended 7"		
currette, uterine sharp ended 9"		
dilator, Haggar' s uterine (one set, size 3-16)		
forceps, artery 8" straight		
forceps, artery Chances (COF) 7"		
forceps, artery Dunhill (COF) 5"		
forceps, artery Spencer Wells 7"		
forceps, artery fine		
forceps, dissecting, toothed, Lanes, 7"		
forceps, dissecting, nontoothed, Trevors 7"		
forceps, dissecting, nontoothed, fine		
forceps, dissecting, nontoothed, lg		
forceps, dissecting, toothed, fine		
forceps, dissecting, toothed, lg		
forceps, double toothed teneculum		
forceps, obstetric		
forceps, ovum (9") medium 2 med, 1 lg		
forceps, sponge holding		
forceps, sponge holding (Lamley or Forester) 9"		
forceps, tissue green armetage		
forceps, tissue, Allis		
forceps, valsellum Trevors 9"		
gallipot 6"		
blade handle, Bard Parker size 3		
kidney dish, lg		
kidney dish, sm		
laryngoscope		

FOR ALL HOSPITALS PERFORMING OBSTETRIC SURGERY:		
9. Hospital Surgical Equipment (cont'd.)	***Number available and satisfactory***	***Last purchase price***
mayo 6 1/2" straight		
mayo 7 1/2" curved		
needle holder, long		
pack, lg green		
retractor, doyens		
retractor, lagenback med		
scissors, mayo curved		
scissors, straight		
scrub brush		
sheet, plastic Macintosh		
speculum, Auvard 9"		
speculum, Simms 9" small		
speculum, Simms 9" large		
sponge holder		
suction end (metal)		
surgical gown		
towel clip		
towel, abdominal sheet		
towel, green		
tray, placenta		
trousers, surgical		
uterine sound graduated 12" double ended		
uterine sound graduated 12" single ended		
vacuum extractor, manual		
vest, surgical		
yankaur		

INVENTORY OF COMMODITIES

Province:		District:		Health Facility:	
Date:		Data Collector:			

Visit the <u>pharmacy or supply areas</u> where drug and medical supply stock records are kept. If there are drug kits or bulk shipments unopened in the <u>facility stores</u>, be sure to count the quantities available.

Enter the strength for each drug found (e.g., 250 mg or 30 mg/ml). If more than one strength is found, record the one with the highest stock level. CONSIDER ANY BRAND NAME ITEMS TO BE THE SAME AS THEIR GENERIC EQUIVALENTS. Next, physically count and record the quantity actually in stock. For tablets or capsules, record the quantity to the nearest half bottle.

After completing the inventory, ask the pharmacist or facility administrator to see drug and medical supply equipment purchasing records for the previous year. If purchasing records are not kept in the health facility, there may be copies in the District Office. For any drug or medical supply item purchased during the previous year, record the most recent purchase price. Prices should NOT be estimated, but based on actual recorded values. If no purchases were made, or records cannot be located, leave cells blank.

FOR ALL FACILITIES:

10. Inventory of Basic Drugs			***Physical count***	***Last purchase price***
Name	***Form***	***Strength?***		
amoxycillin	cap			
augmentin	tablet			
benzathine penicillin	vial			
chloroquine phosphate	tablet			
doxycycline	cap			
erythromycin	tablet			
ferrous sulphate	tablet			
folic acid	tablet			
mebendazole	tablet			
metronidazole	tablet			
norfloxacin	tablet			
paracetamol	tablet			
probenecid	tablet			

FOR ALL FACILITIES PERFORMING NORMAL DELIVERIES:

11. Inventory of Additional Drugs for Delivery			*Physical count*	*Last purchase price*
Name	***Form***	***Strength?***		
cotrimoxazole	tablet			
ergometrine	amp			
lidocaine	ml			
normal saline	bottle			
oxytocin	amp			
tetracycline 1% ointment	tube			

FOR HOSPITALS OFFERING REFERRAL CARE OR OBSTETRIC SURGERY:

12. Inventory of Referral Drugs			*Physical count*	*Last purchase price*
Name	***Form***	***Strength?***		
amikacin	vial			
ampicillin	cap			
ampicillin	vial			
atropine	amp			
ciprofloxacin	tablet			
cloxacillin	cap			
crystalline penicillin	vial			
dextrose 5%	bottle			
dextrose and normal saline	bottle			
diazepam	amp			
gentamicin	amp			
hydralazine	amp			
methyldopa	tablet			
metronidazole suspension	bottle			
neostigmine	amp			
pancurarium	amp			
pethidine	amp			
phenobarbitone	tablet			
prochlorperazine	amp			

FOR HOSPITALS OFFERING REFERRAL CARE OR OBSTETRIC SURGERY:

12. Inventory of Referral Drugs (cont'd.)			*Physical count*	*Last purchase price*
Name	***Form***	***Strength?***		
sterile water	vial			
suxamethonium	amp			
thiopentone sodium	amp			

FOR ALL FACILITIES:

13. Inventory of Basic Medical Supplies	*Physical count*	*Last purchase price*
antenatal record		
glass slide		
glass tube, blood, red top		
glass tube, capillary		
lancet		
reagent for blood typing		
syringe and needle		
urine dipsticks (bottle of 100)		
VDRL kit		

FOR ALL FACILITIES PERFORMING NORMAL DELIVERIES:

14. Inventory of Additional Medical Supplies	*Physical count*	*Last purchase price*
branula		
cord clamps		
gauze, absorbent		
gloves, non-sterile (pair)		
gloves, sterile (pair)		
IV set		
hypochloride 1 L		
sutures, chromic or plain catgut		

FOR HOSPITALS OFFERING REFERRAL CARE OR OBSTETRIC SURGERY:

15. Inventory of Surgical Supplies	***Physical count***	***Last purchase price***
adhesive tape, roll		
elastoplast, roll		
endotracheal tube sz 7.5		
jug, hibitens w/ water, 10 L		
KY jelly, tube		
paper caps		
paper masks		
partogram		
plastic bags, leakproof lg		
scalpel blades sz 23		
spirits 5cc		
suction catheter sz 10		
sutures, chromic catgut sz 1 or 2		
swabs, abdominal lg (1/10 roll)		
swabs, small ratex		
syringe and needle, 20cc		
syringe and needle, 2cc		
syringe and needle, 5cc		

STOCK-OUTS OF TRACER DRUGS

If pharmacy stock records are routinely kept, record the number of days for which the following tracer drugs were out of stock during the previous six months. For each date on which stocks were drawn down to zero, count the number of days in each month until stocks were resupplied and write that number in the appropriate column. If there were no recorded stock-outs in a month, enter 0. If no stock records were kept for a given item, leave it blank.

16. Stock-Outs of Tracer Drugs		***Month/Year***					
		/	**/**	**/**	**/**	**/**	**/**
amoxycillin	cap						
benzathine penicillin	vial						
cotrimoxazole	tablet						
dextrose 5%	bottle						
doxycycline	cap						
ergometrine	amp						
ferrous sulphate	tablet						
lidocaine	ml						
metronidazole	tablet						
normal saline	bottle						
oxytocin	amp						

DATA COLLECTOR OBSERVATIONS

Notes about record keeping at the hospital:

Other observations:

Procedures for Studying Health Care Practice

Check to identify which reproductive health services are offered at the facility. For all services listed below that are offered, select a *random sample of patients* treated at the facility during the *previous five months*. In addition, select randomly from *current postnatal patients* still in the facility and from *current antenatal care patients*. The exact procedures for selecting cases are described below.

Identify cases from registers and medical records as follows:

For Deliveries, Cesarean Sections, and Cases of Maternal Hemorrhage or Sepsis

1. Identify sample cases using one of the suggested registers of cases (see tables 1 and 2)—the maternity log, the surgical theatre log, or the gynecological or medical ward logs.

2. Search for cases in chronological order, starting with the first patient on or after the cutoff date determined prior to the data collection.

3. Search for a case with the correct condition or diagnosis of interest and, when one is found, list her information on the appropriate Listing Form in the space for Primary Sample Cases.

4. Search for the next case with the correct condition or diagnosis and list her identifying information on the Listing Form in the space for Alternative Sample Cases.

5. After the initial primary and the initial alternative case have been found, continue listing one primary and one alternative case per week (for deliveries in a hospital), per two weeks (for C-sections or health center deliveries), or per month (for hemorrhage or sepsis cases).

6. This listing is achieved by skipping to the 8^{th} of the month (if listing deliveries in a hospital), the 15^{th} of the month (if listing C-sections or deliveries in a health center), or the beginning of the next month (if listing hemorrhage or sepsis cases) and repeating steps 2–4.

7. If fewer than the target number of cases to be listed (that is, 40, 20, or 10, respectively) were seen for any condition or diagnosis during the five months under study, simply list all the appropriate cases that were seen during this period.

8. After listing the target number of cases, search for the medical records of the primary sample cases in the department where they are kept at this facility and, for each record found, record the relevant treatment data on the Patient Contact Form.

9. If the medical record for a primary sample case cannot be found, substitute an alternative case, preferably the one seen in the same period as the primary case.

10. Stop recording treatment data after the target number of cases to be recorded has been reached, or when you have searched for all medical records of the listed primary and alternative cases.

11. If no medical records are kept at the facility for a given type of case, simply fill in the listing forms and make a note in the comments section of the Health Facility Survey Form.

For STI Cases and Urinary Tract Infections (UTIs)

1. Identify cases from diagnoses recorded in the outpatient treatment registers, which, in the case of STIs, may be a special register from the STI Program.

2. Usually data on drugs prescribed are recorded directly in the treatment register, so it is not necessary to list cases but only to transfer treatment data to the Patient Contact Form.

3. Record treatment data for one patient every two weeks for STI patients in any type of health facility and for UTI patients in hospitals, and for one UTI patient per month in health centers.

4. If no data on drugs appear on the treatment register, search for data for the sample cases in prescriptions retained at the pharmacy for this period, using the patient's name, ID number, and date.

5. If neither source of data is available on outpatient treatment, skip these cases and make a note in the comments section of the Health Facility Survey Form.

For Current Postnatal Patients

1. Make a list of names of all mothers currently staying in the health facility who have delivered a baby within the past week, including mothers with complications who may have been admitted to the general medical or surgical wards. (See Maternal History in Mothers Interview Form.)

2. Select up to five mothers from this list in hospitals or maternity homes and up to three mothers in health centers.

3. If there are fewer than the target number of mothers, select all who are available and make a note in the comments section of the Health Facility Survey Form.

4. Ask to see the ANC cards and medical records of the mothers in the sample, and record the content of their first antenatal visits on the Patient Contact Form.

5. Interview briefly the mothers in the sample, explaining the purpose of the study, and gather the data to complete the Mothers Interview Form.

For Current ANC Patients

1. Visit the MCH clinic of the facility, or the outpatient department (OPD) if MCH services are integrated, to identify mothers who have come for ANC services.

2. Choose at random five mothers who have ANC cards or books with them, explain briefly the purpose of the study, and ask to examine their cards or books.

3. Record the information from their cards or books pertaining to *their first ANC visit only* on the Patient Contact Form.

4. Interview the mothers in the sample and gather the data to complete the Mothers Interview Form, skipping the sections pertaining to labor and delivery.

5. The ANC sample should *always* be completed at a hospital, but if there are too few ANC mothers present at a health center or dispensary on the day of the survey, skip these cases and make a note in the comments section of the Health Facility Survey Form.

Table 1. Guidelines for Selecting Patient Encounter Samples at Facilities with Referral Services

IF THE FACILITY IS A HOSPITAL OR MATERNITY HOME OFFERINGS REFERRAL SERVICES			
RH Problem	**No. to Record**	**No. to List**	**Possible Sources of Patient Records**
RETROSPECTIVE SAMPLE			
Deliveries	20	40	maternity log
Cesarean section	10	20	delivery outcome cards, theatre or maternity logs
Maternal hemorrhage	5	10	gynecology ward or theatre logs
Maternal sepsis	5	10	gynecology or general medicine ward logs
STI (gonorrhea, syphilis, PID)	10	NA	STI program or OPD treatment logs
Urinary tract infections	10	NA	OPD treatment log
CONCURRENT SAMPLE			
Current ANC patients	5	NA	mothers waiting for ANC services
Current deliveries	Up to 5	NA	current postnatal patients

Table 2. Guidelines for Selecting Patient Encounter Samples at Facilities without Referral Services

IF THE FACILITY IS A HEALTH CENTER OR MATERNITY HOME WITHOUT REFERRAL SERVICES			
RH Problem	**No. to Record**	**No. to List**	**Possible Sources of Patient Records**
RETROSPECTIVE SAMPLE			
Deliveries	10	20	maternity log
STI (gonorrhea, syphilis, PID)	10	NA	STI program or OPD treatment logs
Urinary tract infections	5	NA	OPD treatment log
CONCURRENT SAMPLE			
Current ANC patients	5	NA	mothers waiting for ANC services
Current deliveries	Up to 3	NA	current maternity patients

Cost-Estimate Strategy (CES) Survey

MATERNAL DELIVERIES RETROSPECTIVE LISTING FORM

District:		Health Facility:	
Date of Interview:		Data Collector:	

PRIMARY SAMPLE OF DELIVERIES

	Visit Date	*Name*	*ID*	*Outcome/ Complication*	*Record Found?*
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

MATERNAL DELIVERIES RETROSPECTIVE LISTING FORM

ALTERNATIVE SAMPLE OF DELIVERIES

	Visit Date	*Name*	*ID*	*Outcome/ Complication*	*Record Found?*
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					
31					
32					
33					
34					
35					
36					
37					
38					
39					
40					

Cost-Estimate Strategy (CES) Survey

CESAREAN SECTION RETROSPECTIVE LISTING FORM

District:		Health Facility:	
Date of Interview:		Data Collector:	

PRIMARY SAMPLE OF C-SECTIONS

	Visit Date	*Name*	*ID*	*Outcome/ Complication*	*Record Found?*
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					

ALTERNATIVE SAMPLE OF C-SECTIONS

	Visit Date	*Name*	*ID*	*Outcome/ Complication*	*Record Found?*
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

Cost-Estimate Strategy (CES) Survey

MATERNAL HEMORRHAGE RETROSPECTIVE LISTING FORM

District:		Health Facility:	
Date of Interview:		Data Collector:	

PRIMARY SAMPLE OF HEMORRHAGE CASES

	Visit Date	*Name*	*ID*	*Outcome/ Complication*	*Record Found?*
1					
2					
3					
4					
5					

ALTERNATIVE SAMPLE OF HEMORRHAGE CASES

	Visit Date	*Name*	*ID*	*Outcome/ Complication*	*Record Found?*
6					
7					
8					
9					
10					

Cost-Estimate Strategy (CES) Survey

MATERNAL SEPSIS RETROSPECTIVE LISTING FORM

District:		Health Facility:	
Date of Interview:		Data Collector:	

PRIMARY SAMPLE OF MATERNAL SEPSIS CASES

	Visit Date	***Name***	***ID***	***Outcome/ Complication***	***Record Found?***
1					
2					
3					
4					
5					

ALTERNATIVE SAMPLE OF MATERNAL SEPSIS CASES

	Visit Date	***Name***	***ID***	***Outcome/ Complication***	***Record Found?***
6					
7					
8					
9					
10					

Cost-Estimate Strategy (CES) Survey

Cost-Estimate Strategy (CES) Survey

PATIENT CONTACT FORM

District:		Health Facility:		Data Collector:		Date:	

Type*	Patient ID	Visit Date	Age	Prescriber**
	Describe Conditions/Health Problems			Code
	Drug Name/Strength or Lab Test		Dose/Quantity	Code
Drugs or Lab Tests				
Comments (e.g., outcomes or complications):				

*Type: 1=delivery, 2=Cesarean section, 3=hemorrhage, 4=sepsis, 5=STI, 6=UTI, 7=current ANC

Type*	Patient ID	Visit Date	Age	Prescriber**
	Describe Conditions/Health Problems			Code
	Drug Name/Strength or Lab Test		Dose/Quantity	Code
Drugs or Lab Tests				
Comments (e.g., outcomes or complications):				

**Prescriber: 1=doctor, 2=clinical officer, 3=nurse, 4=midwife, 5=other

Cost-Estimate Strategy (CES) Survey

Cost-Estimate Strategy (CES) Survey

HEALTH CARE PROVIDER INTERVIEW

District:		Health Facility:	
Facility Type: (HO=hospital; HC=health center; DI=dispensary)			
Facility Administration (G=government; N=nonprofit private, P=for-profit private)			
Date:		Data Collector:	

Find out from the medical officer in charge the names of all staff currently present at this health facility who are routinely involved in prenatal care, delivery, treatment of postnatal complications, or treatment of STDs. From this list, randomly select the following clinicians to be interviewed:

Type	***Number***
OB/Gyn or other physician (if present)	***1***
clinical officer (if present)	***1***
nurse-midwife, nurse, or midwife	***2***

Locate the clinician and conduct the interview in a private location.

RESPONDENT BACKGROUND

After introducing the purpose of the study to the respondent, confirm that he/she is currently involved in treating women during pregnancy, delivery, or with STDs. Explain that you would like to ask some general questions about his/her background, training, and current duties.

1. Respondent gender *Check one.*	1 Male	2 Female
2. What is your highest level of qualification?	*Check one category*	
OB/Gyn Specialist	1.	
GP or other medical specialty	2.	
Clinical Officer	3.	
Nurse WITH midwifery training	4.	
Nurse WITHOUT midwifery training	5.	
Midwife	6.	
3. How long have you been in practice? *Check one.*	1. Less than 2 years 2. 2–7 years 3. More than 7 years	

SERVICE PROVISION AND PRACTICE

4. Do you currently provide the following services? *Read and ask about each service separately.*	***Check box ☒***	
Antenatal care	1 Yes	0 No
Treatment of STDs	1 Yes	0 No
Normal delivery	1 Yes	0 No
Cesarean section	1 Yes	0 No
Management of abortion complications/incomplete delivery	1 Yes	0 No

5. When was the last time you saw a woman for her **first antenatal visit** ?	*Check one category* ☒
Within the last week	1.
Within the last six months	2.
More than six months ago	3. skip to Q. 7
Never	4. skip to Q. 7

6. What medicines (including immunizations) or tests did you order or give to her?
Elicit spontaneous response; DO NOT READ OUT LIST.
Probe for multiple responses by asking "Anything else?"
ONLY DRUGS AND TESTS should be listed.

Medicine / Immunization	***Check if mentioned*** ☒	***Test***	***Check if mentioned*** ☒
iron folate		blood grouping	
tetanus toxoid		hemoglobin	
quinine		malaria smear	
chloroquine		stool for ova and parasites	
		urine analysis for glucose & protein	
other drugs *(specify)*:	***Code***	other tests *(specify)*:	***Code***
a.		a.	
b.		b.	
c.		c.	

7. When was the last time you provided care to a woman with **moderate pre-eclampsia**?	*Check one category* ☒
Within the last week	1.
Within the last six months	2.
More than six months ago	3. skip to Q. 9
Never	4. skip to Q. 9

8. What medicines or tests did you order or give to her?

Elicit spontaneous response; DO NOT READ OUT LIST.
Probe for multiple responses by asking "Anything else?"
ONLY DRUGS AND TESTS should be listed.

Medicine	***Check if mentioned*** ☒	***Test***	***Check if mentioned*** ☒
diazepam		urine for protein	
hydralazine		other tests *(specify)*:	***Code***
methyldopa		a.	
paracetamol		b.	
phenobarbitone		c.	
propranolol		d.	
other drugs *(specify)*:	***Code***		
a.			
b.			

9. When was the last time you cared for **a women whose labor was not progressing but who did NOT require a Cesarean section**?	*Check one category* ☒
Within the last week	1.
Within the last six months	2.
More than six months ago	3. skip to Q. 11
Never	4. skip to Q. 11

10. What medicines or tests did you order or give to her before or during her delivery?
Elicit spontaneous response; DO NOT READ OUT LIST.
Probe for multiple responses by asking "Anything else?"
ONLY DRUGS AND TESTS should be listed.

Medicine	***Check ☒ if mentioned***	***Test***	***Check ☒ if mentioned***
dextrose 5%		*(specify)*	***Code***
diazepam		a.	
ergometrine		b.	
oxytocin		c.	
paracetamol		d.	
other drugs *(specify)*:	***Code***		
a.			
b.			
c.			

11. When was the last time that you attended a **normal delivery**?	*Check one category* ☒
Within the last week	1.
Within the last six months	2.
More than six months ago	3. skip to Q. 13
Never	4. skip to Q. 13

12. What medicines or tests did you order or give to her?
Elicit spontaneous response; DO NOT READ OUT LIST.
Probe for multiple responses by asking "Anything else?"
ONLY DRUGS AND TESTS should be listed.

Medicine	***Check ☒ if mentioned***	***Test***	***Check ☒ if mentioned***
diazepam		*(specify)*:	***Code***
ergometrine		a.	
paracetamol		b.	
vitamin K		c.	
other drugs *(specify)*:	***Code***	d.	
a.			
b.			

13. When was the last time you treated a woman who was **hemorrhaging** before, during, or after childbirth?	*Check one category* ☒
Within the last week	1.
Within the last six months	2.
More than six months ago	3. skip to Q. 15
Never	4. skip to Q. 15

14. What medicines (including blood and IV fluids) or tests did you order or give to her?
Elicit spontaneous response; DO NOT READ OUT LIST.
Probe for multiple responses by asking "Anything else?"
ONLY DRUGS AND TESTS should be listed.

Name of Medicine / Blood IV fluid	***Check if mentioned*** ☒	***Test***	***Check if mentioned*** ☒
ergometrine		other tests *(specify)*:	***Code***
oxytocin		a.	
blood transfusion		b.	
IV fluid *(specify)*:		c.	
other drugs *(specify)*:	***Code***	d.	
a.			
b.			

15. When was the last time you performed a **Cesarean section**?	*Check one category* ☒
Within the last week	1.
Within the last six months	2.
More than six months ago	3. skip to Q. 17
Never	4. skip to Q. 17

16. What medicines (including IV fluids, anesthesia, and analgesics) or tests did you order or give during the Cesarean section?

Elicit spontaneous response; DO NOT READ OUT LIST.
Probe for multiple responses by asking "Anything else?"
ONLY DRUGS AND TESTS should be listed.

Medicine	***Check ☒ if mentioned***	***Test***	***Check ☒ if mentioned***
atropine		(specify):	***Code***
IV fluids		a.	
neostigmine		b.	
normal saline		c.	
oxytocin		d.	
paracetamol		e.	
pethidine		f.	
prochlorperazine		g.	
sterile water			
suxamethonium			
thiopentone sodium			
other drugs *(specify)*:	***Code***		
a.			
b.			

17. When was the last time you treated a women with **postpartum sepsis**?	*Check one category* ☒
Within the last week	1.
Within the last six months	2.
More than six months ago	3. skip to Q. 19
Never	4. skip to Q. 19

18. What medicines (including IV fluids) or tests did you order or give to her?

Elicit spontaneous response; DO NOT READ OUT LIST.
Probe for multiple responses by asking "Anything else?"
ONLY DRUGS AND TESTS should be listed.

Medicine	***Check ☒ if mentioned***	***Test***	***Check ☒ if mentioned***
amoxycillin		*(specify)*:	***Code***
ampicillin		a.	
dextrose 5%		b.	
gentamicin		c.	
metronidazole		d.	
paracetamol		e.	
other drugs *(specify)*:	***Code***		
a.			
b.			

19. When was the last time you treated a woman with **urinary tract infection**?	*Check one category* ☒
Within the last week	1.
Within the last six months	2.
More than six months ago	3. skip to Q. 21
Never	4. skip to Q. 21

20. What medicines or tests did you order or give to her?

Elicit spontaneous response; DO NOT READ OUT LIST.
Probe for multiple responses by asking "Anything else?"
ONLY DRUGS AND TESTS should be listed.

Medicine	***Check ☒ if mentioned***	***Test***	***Check ☒ if mentioned***
ampicillin		*(specify)*:	***Code***
amoxycillin		a.	
cotrimoxazole		b.	
erythromycin		c.	
metronidazole		d.	
nitrofurantoin		e.	

20. What medicines or tests did you order or give to her (cont'd.)?
Elicit spontaneous response; DO NOT READ OUT LIST.
Probe for multiple responses by asking "Anything else?"
ONLY DRUGS AND TESTS should be listed.

other drugs *(specify)*:	***Code***		
a.			
b.			

21. When was the last time you treated a woman with **genital ulcers**?	*Check one category* ☒
Within the last week	1.
Within the last six months	2.
More than six months ago	3. skip to Q. 23
Never	4. skip to Q. 23

22. What medicines or tests did you order or give to her?
Elicit spontaneous response; DO NOT READ OUT LIST.
Probe for multiple responses by asking "Anything else?"
ONLY DRUGS AND TESTS should be listed.

Medicine	***Check if mentioned*** ☒	***Test***	***Check if mentioned*** ☒
amoxycillin		(specify):	***Code***
benzathine penicillin		a.	
ciprofloxacin		b.	
doxycycline		c.	
erythromycin		d.	
norfloxacin		e.	
other drugs *(specify)*:	***Code***		
a.			
b.			

23. When was the last time you treated a woman with a **vaginal discharge**?	*Check one category* ☒
Within the last week	1.
Within the last six months	2.
More than six months ago	3. skip to Q. 25
Never	4. skip to Q. 25

24. What medicines or tests did you order or give to her?

Elicit spontaneous response; DO NOT READ OUT LIST.
Probe for multiple responses by asking "Anything else?"
ONLY DRUGS AND TESTS should be listed.

Medicine	***Check ☒ if mentioned***	***Test***	***Check ☒ if mentioned***
amoxycillin		(*specify*):	***Code***
augmentin		a.	
doxycycline		b.	
erythromycin		c.	
norfloxacin		d.	
probenecid			
other drugs *(specify)*:	***Code***		
a.			
b.			

25. When was the last time that you treated a woman with **vaginal discharge** and **lower abdominal pain**?	*Check one category* ☒
Within the last week	1.
Within the last six months	2.
More than six months ago	3. skip to end
Never	4. skip to end

26. What medicines and/or tests did you order or give to her?

Elicit spontaneous response; DO NOT READ OUT LIST.
Probe for multiple responses by asking "Anything else?"
ONLY DRUGS AND TESTS should be listed.

Medicine	***Check ☒ if mentioned***	***Test***	***Check ☒ if mentioned***
amoxycillin		*(specify):*	***Code***
doxycycline		a.	
erythromycin		b.	
metronidazole		c.	
norfloxacin		d.	
other drugs *(specify)*:	***Code***		
a.			
b.			

This is the end of the interview. Thank the participant for his/her time.

`

Cost-Estimate Strategy (CES) Survey

MOTHERS INTERVIEW FORM

District:		Health Facility:	
Date of Interview:		Data Collector:	

This form should be used for interviewing (1) women who just gave birth and are still in their postnatal stay or (2) pregnant mothers attending MCH clinic. After introducing yourself and the survey, explain that you would like to ask about her experience during pregnancy (and birth, if she has already delivered).

1. Type of Respondent (check one):	a. Antenatal clinic attender	
	b. Postnatal mother	

ANTENATAL CARE

2. How many months pregnant were you when you first visited a health facility for antenatal care during this pregnancy? *Enter number of months; if no antenatal visits, enter 0.*	months ***If no ANC visit, skip to Q. 8***	
3. What kind of health facility did you attend for your first antenatal visit? *Read list and check one.*	***Check one type*** ☒	
a. government hospital	1.	
b. mission hospital	2.	
c. government health center	3.	
d. government dispensary	4.	
f. other *(specify):*	5.	
4. Did they do any of the following during your first antenatal visit? *Read each item and record response; leave item blank if mother does not know.*	***Check box*** ☒	
a. take a blood sample from you or prick your thumb for tests?	1 Yes	0 No
b. take urine from you for tests?	1 Yes	0 No
c. take stool from you for tests?	1 Yes	0 No
5. Did you receive any drugs or injections during your first antenatal visit?	1 Yes	0 No ***Skip to Q.7***

6. Which drugs were they? *Elicit spontaneous response; DO NOT READ LIST; probe by asking "Anything else?"*	*Check boxes* ☒
drug for anemia (iron folate, ferrous sulfate, folic acid)	
vitamin	
tetanus immunization	
malaria medication	
others (specify):	
7. Overall, please tell me all the drugs that you are taking (or have taken) during your pregnancy, including those suggested by health workers and those you got for yourself. *Elicit spontaneous response; DO NOT READ LIST; probe by asking "Anything else?"*	*Check box(es)* ☒
drug for anemia (iron folate, ferrous sulfate, folic acid)	
vitamin	
tetanus immunization	
malaria medication	
others (specify):	

If the respondent is a mother attending an antenatal clinic, this is the end of the interview. Thank the respondent for her time and ask if she has any questions.

COMMODITIES AND COST FOR DELIVERY

8. Were you asked to bring any of the following drugs or supplies to this facility for your delivery? *Read list, check box, and enter number and cost of each item.*	***Check box*** ☒		***If yes, enter no. and cost***	
			Number	***Cost***
gloves	1 Yes	0 No		
sutures	1 Yes	0 No		
drugs (specify):	1 Yes	0 No		
mackintosh	1 Yes	0 No		
other (specify):	1 Yes	0 No		
9. In total, how much did you spend to buy items that you needed for your delivery? *Enter the amount. If not known or if no items were purchased, enter 0.*				

10. Finally, I would like to know a few things about your labor and delivery.	***Check box*** ☒	
a. Did you have surgery for your delivery?	1 Yes	0 No
b. Did you receive any IV drugs while you were in the labor room?	1 Yes	0 No
c. Did you receive a blood transfusion?	1 Yes	0 No

This is the end of the interview. Thank the respondent for her time and ask if she has any questions.

`

Cost-Estimate Strategy (CES) Survey

PHARMACY SURVEY FORM

District:		Pharmacy:	
Date:		Data Collector:	

Introduce yourself to the person in charge of the pharmacy and explain the purpose of the study. Ask if it would be possible to ask a few short questions about care during pregnancy to (1) the pharmacist and (2) one of the counter staff who regularly waits on customers. Conduct the interviews separately.

1. Type of respondent (check one):	a. pharmacist	
	b. other pharmacy employee	

PRACTICES AND RECOMMENDATIONS

2. On average, about how many pregnant women visit this pharmacy each week? *Enter number; if not known, enter 0.*		
3. Are there drugs (prescription or OTC) that you <u>recommend</u> for pregnant women? *If yes, ask to see the drugs and record the following information.*	1 Yes	0 No

Trade Name, Strength	***Amount usually sold to one customer***	***Price to the customer***
a.		
b.		
c.		
d.		
e.		

4. Are there drugs (prescription or OTC) that you recommend against for pregnant women? *If yes, ask to see the drugs and record the following information.*	1 Yes	0 No

Trade Name, Strength	*Amount usually sold to one customer*	*Price to customer*
a.		
b.		
c.		
d.		
e.		

5. Is there any other information that you give to pregnant customers? What? *Elicit spontaneous response; probe for multiple responses;* ***do not read the list.***	*Check box* ☒	
a. Visit an antenatal care clinic	1 Yes	0 No
b. Take iron folate	1 Yes	0 No
c. Dietary advice (*specify*):	1 Yes	0 No
d. Other (*specify*):	1 Yes	0 No

6. If you have a female customer who has had vaginal discharge for the last two weeks, what would you recommend to her? *Elicit spontaneous response; probe for multiple responses;* ***do not read the list.***	*Check box* ☒	
Visit a doctor	1 Yes	0 No
Get tested for STI	1 Yes	0 No
Take drugs (*specify*):	1 Yes	0 No
Other (*specify*):	1 Yes	0 No

7. If you recommend drugs, could you please show me the ones you recommend?
Record the following information.

Trade Name, Strength	*Amount usually sold to one customer*	*Price to customer*
a.		
b.		
c.		
d.		
e.		

`

MEDICAL SUPPLIES FOR DELIVERY

8. If a pregnant customer or her family member comes to your shop to buy medical supplies for her delivery at a health facility, what items does she usually buy?

Item	*Number of Units*	*Unit Price*
a.		
b.		
c.		
d.		
e.		

If this is the second interview conducted in this pharmacy and you have already completed the inventory of commodities, skip to the end of the interview.

INVENTORY OF COMMODITIES

Check if this pharmacy has the following drugs in stock. The drugs are listed by generic names, but consider all brand name products containing the same ingredient to be equivalent. If one or more equivalent products are in stock, ask the respondent which is the most popular. Record the trade name, strength, pack size, and price of the most popular brand for each item.

Tracer Drugs		*Check* ☒ *if in stock*	*Information on most popular brand*		
			Trade Name, Strength	*Usual amount sold to one customer*	*Price to the customer*
amoxycillin	cap				
benzathine penicillin	vial				
cotrimoxazole	tablet				
dextrose 5%	bottle				
doxycycline	cap				
ergometrine	amp				
ferrous sulphate	tablet				
lidocaine	ml				
metronidazole	bottle				
normal saline	amp				
oxytocin	tablet				

Tracer Supplies	*Check ☒ if in stock*	*Information on most popular brand*		
		Trade Name, Strength	*Usual amount sold to one customer*	*Price to the customer*
gauze, absorbent				
gloves, sterile (pair)				
sheet, plastic (Macintosh)				
sutures, chromic or catgut				

This is the end of the interview. Thank the respondent for his/her time and ask if there are any questions.

`

Cost-Estimate Strategy (CES) Survey

Instructions for Simulated Purchase Survey at Pharmacies

Scenario:

The surveyor will enter the pharmacy and tell the pharmacy attendant (regardless if she/he is a pharmacist or not) that she thinks she is pregnant. She has been feeling sick in the morning and sometimes vomits. She also feels weak and dizzy. The surveyor will then ask the person at the counter who assists her for advice on what products are best to treat this condition.

No other information will be given at this point, unless asked for by the pharmacy attendant.

At some point before the end of the interview, ask the pharmacy attendant if she/he is a pharmacist.

Only if the pharmacy attendant asks her questions, the surveyor will provide the following information:

General Condition:
- The surveyor has been having this problem for the last few weeks.
- Her last period was 4 months ago.
- She does not have joint pain or fever.
- She does not have any previous children.

Antenatal Care:
- She has not visited any doctor because she is usually very busy during the day.
- She does not have a regular doctor.
- She is not taking any medication or special food.

Purchase of Drugs:
- At first, the surveyor should not mention how much she is willing to spend on drugs to treat her condition.
- If the total cost of products that the pharmacy attendant recommends exceeds the amount that was set for the survey (about $5 in local currency), she should mention that she has only a little money to spend on drugs.
- If the pharmacy attendant recommends an antibiotic for more than one week, the surveyor should tell the pharmacy attendant that she would like to try it for one week first.

Actions:

The surveyor will remember:
- Any questions that the pharmacy attendant asks before making a recommendation;
- Any advice about the products recommended;
- Any advice about products that she should avoid;
- Any other advice about how to deal with the condition she presented.

Purchase all products recommended in the quantities offered, if they are within the amount which the surveyor told the pharmacy attendant she can spend. (*Keep all receipts*.) Remember names and prices of products that the surveyor does not purchase, but which were recommended by the shop attendant.

All information should be recorded on the information sheets by the surveyor as soon as possible after leaving the store.

Cost-Estimate Strategy (CES) Survey

`

Cost-Estimate Strategy (CES) Survey

PHARMACY SIMULATED PURCHASE SURVEY FORM

Province:		District:		Name of Pharmacy:	
Date:		Data Collector:			

Complete this form after leaving the store, based on your memory of the interaction with the pharmacist or shop attendant.

ANTENATAL CARE

1. Person who waited on simulated customer:	***Check box*** ☒
	1 Pharmacist
	2 Other

2. Which of the following questions did the counter attendant ask you before making a treatment recommendation?	***Check box*** ☒	
a. Pregnancy tested?	1 Yes	0 No
b. Visited antenatal care or OB/GYN doctor?	1 Yes	0 No
c. When was the last period?	1 Yes	0 No
d. Have lack of sleep or rest?	1 Yes	0 No
e. Have joint pain?	1 Yes	0 No
f. Have fever?	1 Yes	0 No
g. Lost appetite?	1 Yes	0 No
h. Other (*specify*):	1 Yes	0 No
	1 Yes	0 No

3. Record the following information about all drugs recommended, including those that you did not purchase because of the price. Check the products that you purchased.

Brand Name (Generic Name)	***Reason Recommended***	***Number Suggested***	***Price for Suggested Number***	***Check if Purchased***
a. (generic name:)				
b. (generic name:)				
c. (generic name:)				
d. (generic name:)				
e. (generic name:)				
f. (generic name:)				
g. (generic name:)				

4. When you mentioned that you had a limited budget, what advice did the attendant give you?	***Check box ☒***	
a. To substitute less expensive generic products	1 Yes	0 No
b. To purchase fewer products	1 Yes	0 No
c. To purchase less of the products recommended	1 Yes	0 No
c. To purchase all drugs, and pay later	1 Yes	0 No
d. Other (*specify*):	1 Yes	0 No

`

5. What other advice did the pharmacy attendant give you?	*Check box* ☒	
a. To visit an antenatal care clinic	1 Yes	0 No
b. Recommended a doctor or midwife	1 Yes	0 No
c. Diet or food supplement	1 Yes	0 No
d. To have blood pressure checked	1 Yes	0 No
e. To avoid certain drugs	1 Yes	0 No
f. Other (*specify*):	1 Yes	0 No
	1 Yes	0 No
	1 Yes	0 No
	1 Yes	0 No

Comments: